

# MOTOR AGE

Chicago, March 19, 1914

Ten Cents a Copy



**R**

**ound the World on Kerosene**

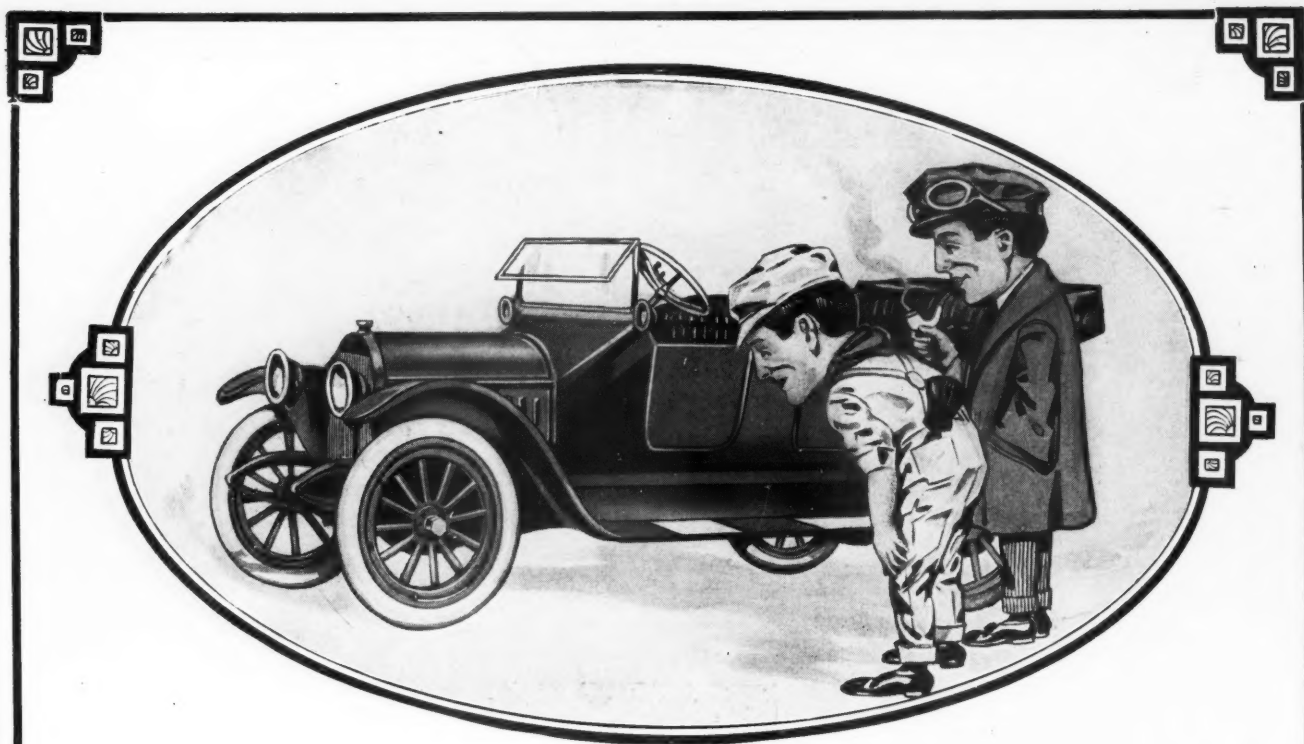
*Experiences of two Americans in United Kingdom on globe-girdling tour.*

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*Six best foreign drivers nominated for Indianapolis International Sweepstakes.*

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## The Announcement that the Cadillac Company Has No Intention of Marketing a Six Cylinder Car has Produced a Profound Impression

The confidence which is reposed in the Cadillac Company is much more than a mere compliment.

It is an important trust—a grave responsibility.

Motorists by the thousand wait to see what action the Cadillac Company will take in matters of motor car design and development.

That great army of owners, in particular, who have invested more than one hundred and thirty millions (\$130,000,000) of dollars in Cadillac cars, accept the decision of this company, for or against a principle of construction, as authoritative and final.

That is why the announcement that the Cadillac Company has no intention of marketing a six cylinder car produced such a profound impression.

It was natural that Cadillac owners, present or prospective, should wait for word on the subject from this company, and it was equally natural that, having received this word, they should immediately and unanimously accept it as conclusive.

How widely the assumption had been traded upon was indicated by the immediate effect everywhere.

Hundreds who had been waiting for word from the Cadillac Company, have bought Cadillac cars since the announcement appeared.

The statement that the company had thoroughly experimented with the six cylinder—as it had with the one, with the two and with the three cylinder—and the announcement of the verdict, was enough.

Under the circumstances it seems to us permissible to remind our friends of an important fact.

We would like to remind them again that the Cadillac Company has seldom found it wise to look to others for guidance.

Rather, it has found that greatest wisdom lay in proving for itself what is best in principle and most practical in application.

The Cadillac was first to produce a practical, enduring motor car. How practical it was, how enduring it was, the whole world knows, since these eleven years old cars are still in service.

The Cadillac was first to produce a high grade car to sell under \$2000.

The Cadillac was first to evolve a four cylinder engine, the correctness of whose principles in their entirety, have proven incontestable after ten years of service.

The Cadillac was first to inaugurate the electrical system of automatic cranking, lighting and ignition.

The Cadillac was first to make practical in large production, the two-speed direct drive axle.

None of these were forced upon us.

They were all evolved in the natural course of Cadillac development.

Cadillac principles are the same today as ten years ago—only they have developed progressively, logically, step by step.

The tree has grown and flowered and flourished—but it is still the same tree.

The history of automobile manufacture is a history of change—often a bewildering succession of contradictory changes, made in a vain effort to interpret the trend of popular demand, or a disposition to follow what appear to be the lines of least resistance.

The Cadillac Company has never shifted, never retraced its steps, never advocated a vital principle which it was afterward compelled to repudiate. The Cadillac is discussed in almost every sale of a motor car, except sales of lowest price. It is almost invariably held in mind as a pattern, a standard, a criterion or an ideal.

Those who drive the car cannot be dislodged from their allegiance. They are positive and determined, oftentimes to the point of stubbornness.

They will hear no slighting comments on the car without resentment. They will concede no higher degree of engineering authority. They will accept no principle as best unless that principle be endorsed by the Cadillac.

That is precisely because the Cadillac has been scientifically progressive—but not impulsive or fickle.

It is precisely because the Cadillac has inaugurated instead of followed.

The Cadillac Company believes the Cadillac car to be immeasurably superior.

The Cadillac Company knows the riding qualities of that car with its two-speed axle, to be inimitable and unique.

The Cadillac Company believes that in all of those qualities which make for supreme satisfaction, for economical operation and maintenance, for constant and enduring service, day-in-and-day-out and year-in-and-year-out in the hands of the every-day user, the Cadillac stands pre-eminent.

And Cadillac owners share in these beliefs.

If they elected to wait for pronouncement of Cadillac policy in regard to the six cylinder car, it was not from lack of confidence, but the exact opposite.

It was one of the highest compliments ever paid the Cadillac Company.

And the Cadillac Company having spoken, the case is closed for every Cadillac owner, present or prospective.

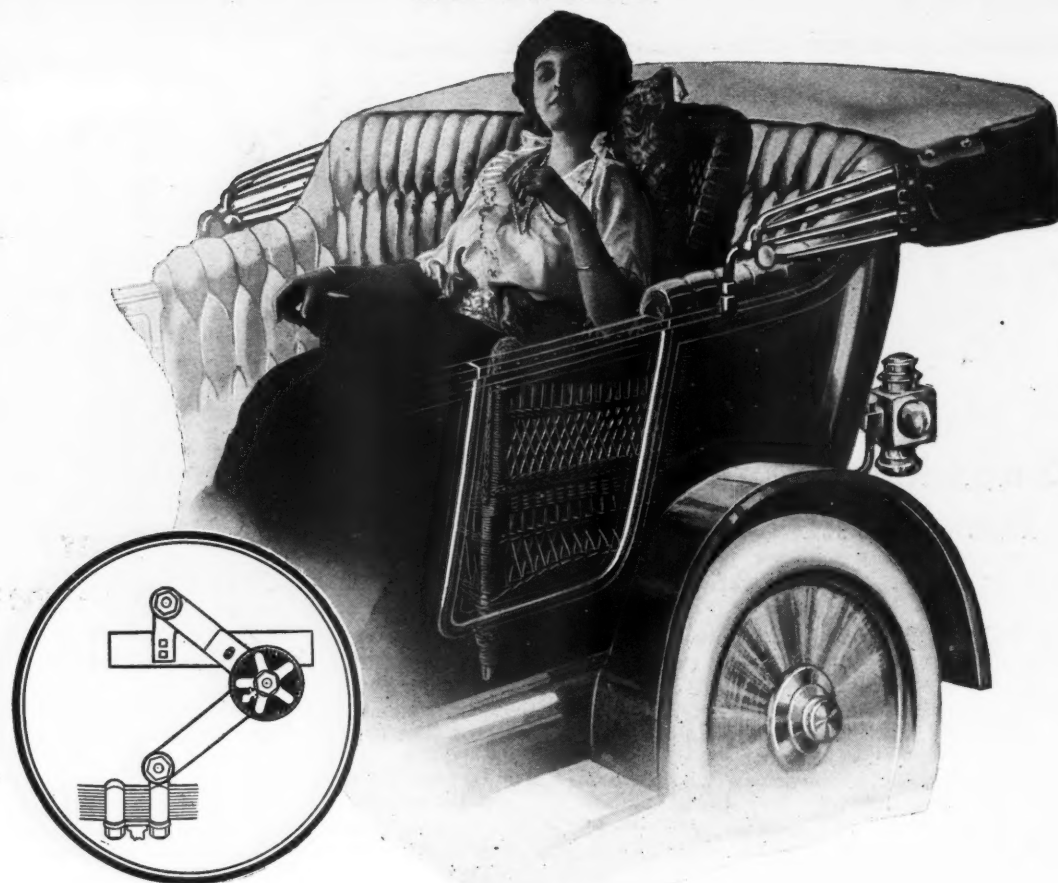
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# MOTOR AGE



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Volume XXV

MARCH 19, 1914

No. 12

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### *There Are Practically No White Cars on the Second-Hand Market*

The real merit of any make of car is best shown by its absence from the second-hand market.

Look through the classified lists of any newspaper. Note the scarcity of Whites in the column after column of cars advertised for sale. Think what this means.

The chassis of White Cars are built in the same factory, by the same men, of the same identical materials as White Trucks.

And the most essential points of motor truck superiority—the features which have given White the supremacy among all motor trucks, both in quantity and value of production—are durability and continued economy of operation.

The bodies of White Cars are proper in outline, dignified and conservative, and because never extreme, are always in style.

White bodies are built, like White chassis, to last for years, and are not designed to make the owner feel obliged, for mere appearance sake, to purchase a new car every year.

Extreme styles in motor cars are due more to the desire on the part of the manufacturer to force an immediate market rather than to sell cars which will give definite satisfaction for years to come.

So thoroughly does the public believe in the superior wearing qualities and continued economy of operation of White Cars, that every White Dealer has a waiting list for used White Cars which he cannot supply.

The White Company, as far as White Cars are concerned, has no second-hand problem.

And because the demand for used White Cars so far exceeds the supply, White Owners are continually importuned to trade their cars for other makes, because dealers know that used Whites can be sold immediately for the highest cash price.

But White Owners rarely trade. They know that their old Whites are better today, more economical to operate, and will be worth more next year and in years to come than the new cars offered in exchange.

Buy your car from a manufacturer who builds for keeps—not for trades.

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WHITE COMPANY HAS ALWAYS OPPOSED FREQUENT TRADES**

*We issue separate catalogs for White "30" "40" and "60" Passenger Cars, also for White "Delivery Trucks" and "Heavy Service Trucks." We will gladly send the ones you want*

**THE WHITE  COMPANY**

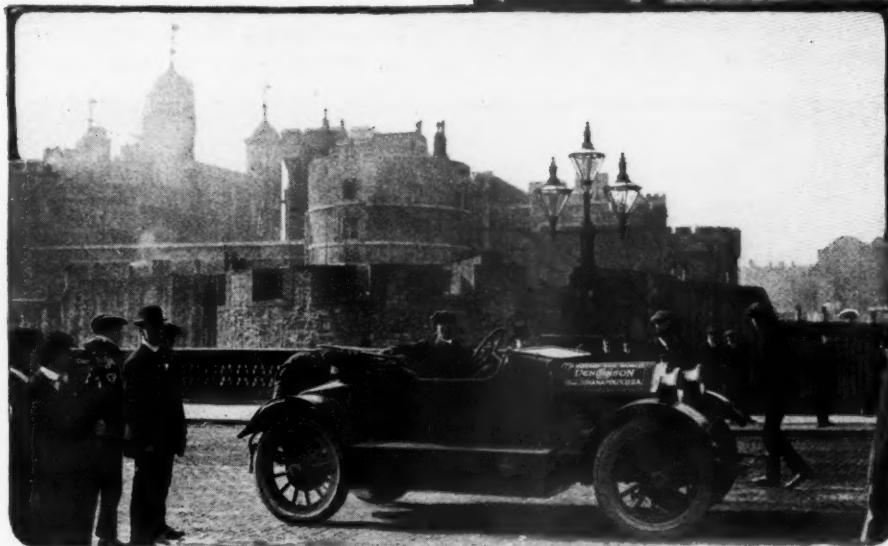
**Manufacturers of Gasoline Motor Cars, Motor Trucks and Taxicabs  
CLEVELAND**

# MOTOR AGE

## 'Round the World on Kerosene



Globe-girdling car in front of the capitol at Washington



Passing inspection in the shadows of the old tower of London

By Edwin P. Kohl

"A ROUND the world in a motor car" had become such a familiar phrase to us by the time we were ready to start our world-girdling journey that we no longer seemed impressed with the magnitude of the trip. Perhaps this was due to the fact that in the 6 weeks' previous try-out of the car, we had become satisfied with the Henderson's qualifications for successfully making such a gruelling tour. Since our roadster was a regular stock car, instead of being built especially for the trip, we found it advisable to add certain special equipment, consisting of an aux-

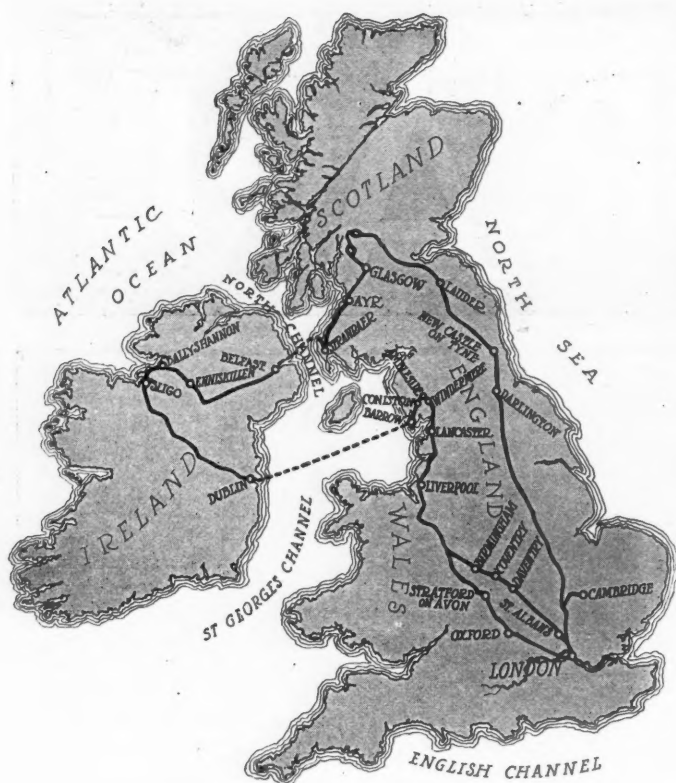
iliary fuel tank holding 25 gallons, two side boxes and a special tire iron in the rear for carrying a number of spares. The boxes were built on the side in the place of the running boards. They had a total capacity of 12 cubic feet, which space when added to the spacious rear deck compartment of the car gave us a great deal of room for carrying equipment. Latter experience demonstrated the wisdom of this provision.

Nothing was taken off the car in anticipation of the strenuous journey before it. We felt that by leaving on the mud

### Part I—Invading the British Isles

This is the first of a series of articles describing the around-the-world tour in a Henderson roadster, equipped with a Harroun kerosene carbureter, of Edwin P. Kohl, a graduate of the University of Wisconsin, and Francis F. Gilmore, a Yale alumnus. The globe-girdlers already have visited the British Isles, Germany, France, Holland, Austria, Russia, Italy and Egypt and are now en route to the Holy Land. At Milan, where the car was shipped to Egypt, the odometer registered 18,000 miles. The tourists have so scheduled their 40,000-mile trip that they will check in at San Francisco at the time of the opening of the Panama-Pacific exposition. In addition to contributing this series of articles to *Motor Age*, Mr. Kohl is taking motion picture films of his trip for Pathe Freres.

guards, etc., making the trip in the same kind of a car as a regular purchaser would drive, we would make the long tour a better criterion of the machine's qualifications. Furthermore, we did not intend to make the around the world trip a race or an endurance test, but a demonstration of the strong qualities of an American car under ordinary and extraordinary condi-



Map showing Henderson's itinerary in the British Isles

tions such as any motorist may encounter with the machine he purchases.

#### Leave Indianapolis August 2

In the cold gray dawn of the morning of August 2 we silently stole out of Indianapolis beginning a 40,000-mile trip without a hand to wave farewell or the shedding of a silent tear, perhaps of joy. As we sped along the great National highway towards Dayton, O., our hearts were not heavy at leaving friends and prospective relatives behind for the engine was humming merrily and the vacuum cup tires were singing accompaniment over the smooth road. The "joy of the open road" was ours. To the light heart, there is enjoyment in everything and fortunately, nothing occurred to the car on its trip to New York to make our thoughts turn from the appreciation of the passing scenery.

Beautiful and interesting as the views along the way through Indiana, Ohio,

world might meet each other "face to face." We purposely arrived in New York late Sunday evening so that the cheering multitude might not impede our

Pennsylvania, and New York are, they are what many other tourists who have passed through that region have seen and need no recapitulation here. We did not purchase a cash register in Dayton for we feared a too close a record of expenses on a trip of this nature would spoil it. But we did take time in Akron, O., the rubber center of the world, to inspect the tire plants so that we might dream of them some day when we might run out of tires in Borneo or similar favorable locations. So also, we showed the Henderson to Niagara Falls that two of the wonders of the

progress and probably pull the car to pieces for souvenirs.

"See America first" was a slogan which appealed to us so we saw New York thoroughly, at the same time giving New York an opportunity of seeing us. Both of us succeeded rather well for it was always a task to get near the "around-the-world car" after it had been left standing on the street for any length of time. The police came near putting in a riot call on several occasions.

#### Make Side Trip to Washington

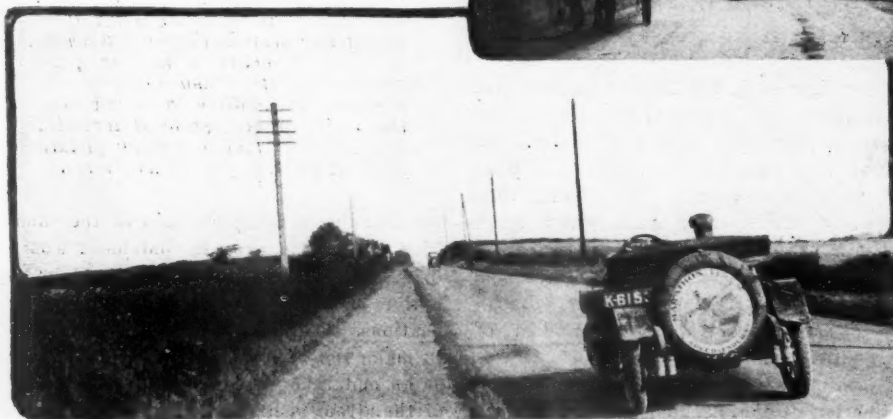
As we felt that President Wilson and Secretary of State Bryan might feel slighted if we did not give them a farewell call before leaving the country, we turned the car's nose south towards Washington, D. C. Incidentally, we wanted to get our passports and special state papers for passing through out-of-way parts of the world. After accomplishing both of these missions and telling our home congressman and senators how sorry we were that we could not vote for them at the next election, we passed northward, gently cursing the Maryland roads as we went.

Naturally, New York hailed with delight our return, but tearfully we told a delegation of prominent citizens that we must on to conquer new worlds. However, they sent their highest official, the late Mayor Gaynor, to accompany us on the Baltic in its transatlantic journey.

Cars for shipment aboard must be crated as they are loaded into the hull of the ship



An effort is made to beautify English country roads and many of them have the appearance of a way through a park. Hedges, well trimmed, take the place of ugly fences



The English roads, leading toward Scotland, are wide and smooth and excellent motor trails

with other freight. The steamship rules provide that all gasoline and oil must be drained off before crating but we claimed exemption on the plea that we used kerosene for fuel. The officials for a moment were at a loss to know what to do but finally ruled that until kerosene was used more commonly for machines and was given a special ruling, we would have to come under the gasoline classification.

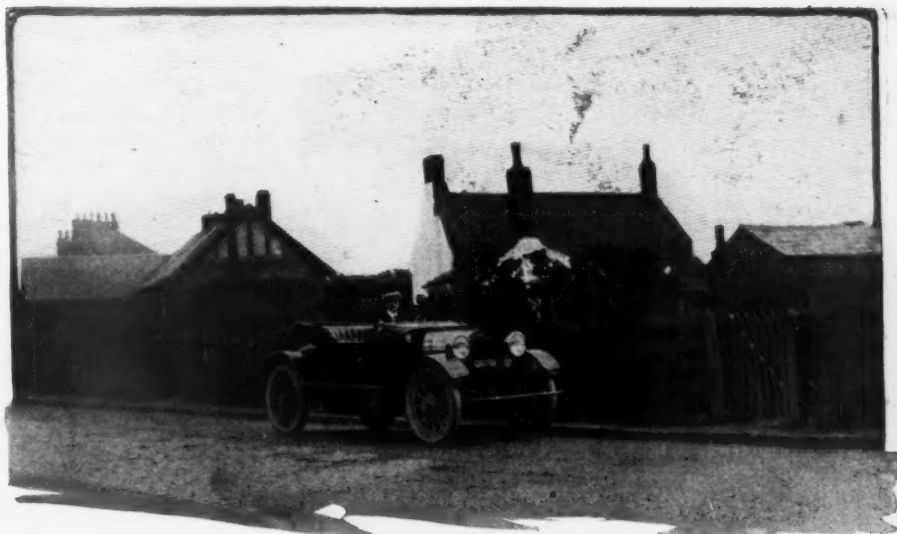


We inwardly thanked the car maker for designing our roadster so low for it saved us many a dollar on cratage and freight. Freight rates are determined by the crated cubical contents of a car, no regard being given to weight. By taking off the front bumper, and lowering the steering wheel, we appreciably decreased this. To insure the car being on the dock on our arrival at Liverpool, we shipped it on the Cedric, the heavy cranes of which lifted it on board from the White Star dock in New York. Then for 2 weeks, the around-the-world Henderson was not making history.

It seemed like finding a long-lost brother when we took the rested car out of the crate on the Canada dock at Liverpool. We had the uncrating done very cheaply for every longshoreman wanted a hand in getting the world girdler ready for driving. After putting a little motor food in its famished tummy, the engine started off as regularly as if it did not mind at all being in a strange country. It rebelled a little at first at the grade of English kerosene, but that was only until we found that "Daylight" was intended for lighting purposes only and that "White Rose" was the most desirable grade of British kerosene for a Harroun carbureter.

#### English Interested in Kerosene

The "paraffine car," for that is what kerosene is called on the other side, was the center of much interest as we drove about Liverpool. Gray-headed business men, who evidently owned cars, would stop to look at the machine and inquire about the satisfaction the new fuel was giving us. Their interest can easily be explained when it is known that petrol (the English name for gasoline) retails at an average of 40 cents a gallon. It is sold only in 2-gallon cans and in out of the way places an excessively high price must be paid for it. The relatively higher cost of gasoline in the British Isles is not due entirely to the cost of transportation or to John D. having John Bull at his mercy, but to the tax which Lloyd-George has imposed on it. Englishmen fear that the universalization of kerosene as a motor fuel will not help the situation much because the government will grab the difference in cost by levying a tax. That, however, is mainly the wail of the members of the Conservative party. But we laughed at Lloyd-George's scheme and at the greedy garage keepers and drove to the Anglo-American Oil Co. (that is what the Standard Oil Co. calls itself there in order to make the English feel that it is a home company since they share in the name—and that is all they do share in) and loaded up our tanks with kerosene at



*Nothing is too good for English roads and brick and cement highways are not uncommon far from the big cities.*

14½ cents a gallon. At our capacity of 40 gallons and gasoline at 40 cents a gallon, we saved over \$10 at one time. That was when we felt like sending Ray Harroun a Christmas present in appreciation for his invention.

Next we had to contribute to the support of the king by securing our registration, drivers' license and number plates. The reader may think there is poor arrangement in this article for after telling about driving all over town, we come

#### LOG OF GLOBE GIRDLING CAR

Number of miles traveled in Great Britain—1506.  
Length of time in British Isles—5 weeks.  
Amount of oil used, bought 1½ gal., free 5 gal. (Invader Oil)—6½ gal.  
Amount of fuel used—paraffine, 127 gal.; petrol for starting, 1½ gal.  
Average cost of paraffine—per gal. (wholesale), 16 cents.  
Average cost of petrol, per gal. (retail)—40 cents.  
Average cost of oil per gal. (retail)—\$1.00.  
Usual charge for storage per night—35 cents.  
Usual charge for washing car—50 cents.  
Usual charge for repair work per hour—35 to 60 cents.  
Facilities of British garages—Usually inferior to U. S.  
Road conditions—Uniformly excellent, macadam paved.  
Hotel accommodations good, but tendency to "stick" American motoring tourists in rates.  
Weather conditions—September and October continually cloudy.

back to the original requisite of securing the license. But the registration department was closed on the Saturday afternoon we got the car from the dock so we took a chance on driving around with our original Wisconsin number. British officials are very keen on punishing persons driving without a license, we have since been told, but the "bobbies" were kept so busy keeping the curious crowds off or in reading the words on the hood of the car, that they entirely overlooked the lack of the number plate. Since then we have discovered that a white W and the number on a blue background is also used by the city of Sheffield. Now we are sorry that we spent \$7 at all for we confidently think we could have "gotten by" with our Wisconsin license and spent the money much more wisely seeing Gaby Deslys in London.

#### Road to London Excellent

By this time the lure of London was calling us, or rather we were in need of supplies which we had sent directly there from New York, so we klaxoned our farewell to Liverpool and signaled the starter to do its duty. Were it not for the fact that our films gave out, we might still be on those beautiful winding roads, taking pictures of their many charms. To an American and especially a westerner, accustomed to the grade of highways there common, it is easy to imagine oneself in the motorists' paradise on the wonderful English roads. We wondered why the splendid roads did not end as we got away from the cities. On and on they ran, taking us into London, a distance of 201 miles, without the tires once touching dirt high-



*Passing the Black Horse Guard near the Houses of Parliament, London*



Picturesque inns and taverns are scattered along the roads north of the world's metropolis

ways or experiencing a single jolt to rock our spines.

At Chester, the old Roman town of Castra, we got on Watling street, the old Roman road. Thereafter, our way led us through the busy manufacturing town of Birmingham; the cathedral town of Coventry; through Daventry, where the British cavalry maneuvers, attended by the king, were taking place; into historic St. Albans and then to the metropolis of the world itself.

#### Heavy Traffic Blocks Motoring

London has so many motor buses, the fare on which is only a penny, and the traffic is so dense and slow that we found it impractical to use the car much there. The people are so inquisitive, a trait usually associated with the country village and not a city of nearly 8,000,000 population, that we could drive through the



The old and the new—passing coaching parties while driving out to the English watering places, Southport and Blackpool

crowds only with difficulty. It was a prison offense to leave the rather striking looking around-the-world American car on the narrow streets which would at once become blocked, and when a London street is blocked, it means that vehicles are

lined up behind each other for blocks, while the drivers play dominoes on the seats or get a glass of ale.

The attractions of London might be detaining us there yet, but the news that snow was falling in northern Scotland drew us away from Piccadilly and out upon "the Great North Road" leading to Edinburgh. We deviated slightly to pass through the great university town of Cambridge. As we drew near, the engine seemed to feel the college atmosphere around which its boyhood days were spent at the University of Wisconsin, for it could hardly be throttled down. Driving

under the archway of elm trees past the weather-worn old buildings, seemed to be like bringing something modern back into the medieval days. The atmosphere seemed to be too quiet and sacred to be disturbed by the throbbing of an engine, so we left the car and walked along the half-dark mossy paths, dreaming of our own American college days. But college days were over, and as we expected to get around the world before our children entered high school, we had to tear ourselves away from this university where some of the greatest minds of our day were moulded.

#### Skirt Robin Hood's Forest

We passed Sherwood forest but did not meet Robin Hood, over the River Don into Doncaster and up to York, the site of the great cathedral, with old Roman walls around the town. Not being very piously inclined that day, we did not tarry long about the ecclesiastical shrine, but hurried up to Darlington to see Stevenson's first locomotive on exhibit at the railway station there. The Darlington and Stockton railway, on which the first steam engine drew a train of cars "with such velocity that in some parts the speed was frequently 12 miles an hour," had this place as its terminus in 1825. Newcastle-upon-Tyne next hove into view. From here came the wise saw: "Carrying coals to

#### EXPENSE RECORD IN GREAT BRITAIN

Date	Town	Motor supplies purchased		Storage	Labor	Miscellaneous
		Paraffine Amt.	Petrol Chg.			
9-13-13	Liverpool	..	..	..	..	Uncrating ... \$ 4.80
9-13-13	Liverpool	..	..	..	..	Port dues.... 22.88
9-13-13	Liverpool	..	..	..	..	Registration . 4.80
9-13-13	Liverpool	..	..	..	..	License & Pl. . 2.04
9-13-13	Liverpool	26	\$3.70	..	..	Tools ..... 3.20
9-14-13	Liverpool	..	..	..	..	Grease ..... .36
..	..	..	..	..	..	Talc ..... .48
..	..	..	..	..	..	Tube liner... 3.60
..	..	..	..	..	..	2 qt. oil.... .48
..	..	..	..	..	..	Nuts, etc.... .24
..	..	..	..	..	..	4 qts. oil... .96
9-15-13	Stafford	..	..	..	..	3 ft. tube.... .48
9-18-13	Fenny	..	..	..	3.60	2 fire ext.... 1.20
9-20-13	London	..	..	..	..	1 vulcan.... .24
9-21-13	London	..	..	1.80	..	Freight ..... 10.92
9-22-13	London	..	..	..	..	Canvas pan.. .92
9-22-13	London	20	3.20	..	..	Funnel ..... .84
9-25-13	St. Ives	..	..	..	8.40	Key & hasp.. .18
..	..	..	..	..	.36	Blowout patch .78
9-26-13	Darlington	25	3.88	..	..	Inner liner... .48
9-27-13	Bowes	..	..	.24	..	Priming can . 24
9-29-13	Edinburgh	26	4.42	.24	..	Priming wire for oil.... 1.44
10- 1-13	Glasgow	..	..	..	..	
10- 5-13	Stranraer	..	..	.72	..	
10- 5-13	Dumfries	10	1.90	..	..	
10- 6-13	Wigan	..	..	..	..	
10- 6-13	Lancaster	20	3.40	..	..	
10- 7-13	Wrexham	10	1.72	.24	..	
10- 8-13	Bridgnorth	..	..	.12	..	
10- 9-13	Whole trip, enroute	..	..	1.44	..	
10-15-13	London	..	..	..	..	
Totals	..	137	\$22.22	11	\$4.58	\$5.64
Sum total	..	..	..	..	\$12.48	\$41.56



Newcastle is like teaching a woman how to talk."

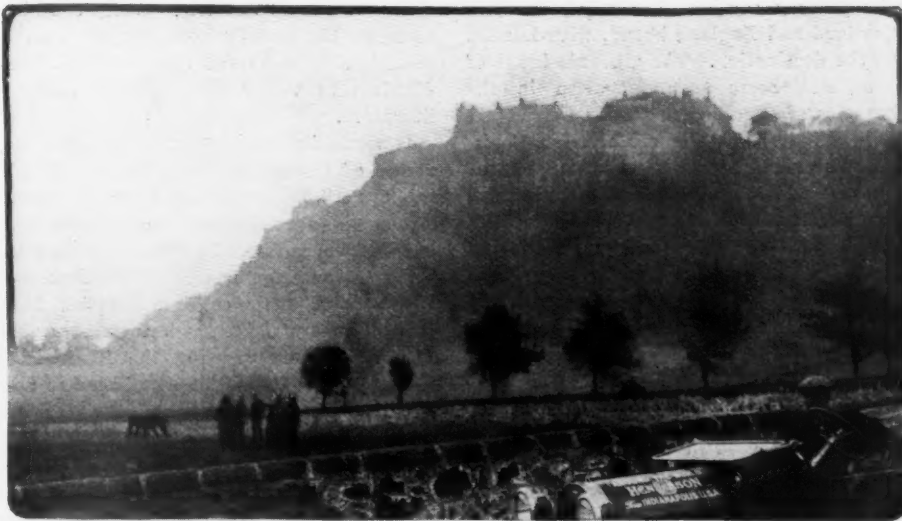
Soon we deviated from the Great North road to see the Scot country and before we got through, we felt much like exclaiming, "Great Scott, what a country!" There is one succession of beautiful scenery, consisting of moss-grown abbey ruins, stately old castles and scenes of historic battles. Small wonder Scott was here inspired to write his stirring tales of the olden days.

Shortly after leaving this literary region, we passed into a musical one, apparently, for we entered Lauder, but Harry evidently was not at home. We now remembered that it was Sunday so we hurried on to Edinburgh for a chicken dinner. When we arrived there, however, we found that the stern old Scotchmen had closed the town tighter than Zion City on Saturday, for not a restaurant or anything else except our mouths was open. But we did not have to eat grass for a bobby told us where insiders could get meat and drink, mostly "scotch." The next morning we went up to the castle which the guide book told us rose to unthinkable heights. Our roadster scaled it with ease, however. Here we saw the bed that Mary, Queen of Scots, slept in and a few lesser curios of interest such as the crown of Scotland and the gun carriage which carried the remains of Queen Victoria and King Edward to the grave.

#### Some Battlefields and Dungeons

The battlefield of Bannockburn and Stirling Castle, about which we had read when we wore short trousers, had to be seen to satisfy our curiosity as to whether it was all a myth. In the latter, we were shown the grewsome dungeon in which King James II invited Douglas for supper and then took back his meal by perforating Douglas and throwing the body over the parapet. After scrapping with the landlord over the bill, we departed for poetic Loch Lomond and Loch Katrine, immortalized in Scott's *Lady of the Lake*. Our gasoline-using friends wanted to wager us that the "kerosene kar" could not get over some of the steep inclines, but as we knew we had a sure thing, we felt that it would be unfair to take their money so we took away their breath as we shot over the slopes.

We were told that we could get underwear cheap in Glasgow and it was getting cold, so we passed up a sojourn in the vicinity of poetic Ben Lomond, and made the "J. M.'s" thump as we hurried over the cobblestones past the



*Stirling Castle, the key to the border between England and Scotland in warlike times—Uniformed Scotch Highlanders in the foreground*

great ship yards into the second city of the kingdom in size. In our zeal to keep the highlanders from stealing the car, we took out the magneto key and mislaid it. But the magneto was equal to the emergency and miraculously started on O, after which we kept the engine running until it died in front of Burns' cottage down in Ayr. Probably it wanted to equal things up by dying where Burns was born. In the cottage we naturally bought some relics and found the magneto key in our pocketbook. English money is so bulky—they do not use paper money—that you could put a copper mine in your purse, after carrying coins of the realm for a time, and not notice the difference. We emptied our purse at Stranrear by buying passage over to Ireland where we expected to see some Home Rule scrapping.

When we found things so quiet in Ulster, the heart of the agitation, we gave the car a rest in Belfast while we went through the ship-building yards where are also the great linen mills which put Irish linen in our tariff schedules. After buy-

ing a shillelah for bad luck and some shamrock for good luck, we turned our vest fronts towards the west coast.

By the time we passed Enniskillen, Ballyshannon and Lisonnvarna, we gave up trying to keep a record of towns in the Emerald Isle and limited ourselves to Dublin, of which we were reminded frequently by the name on the bottles of Guinness's stout.

#### All Irish Cottages Alike

We saved ourselves the expense and trouble of taking many pictures in the land of the blarney by securing early a view of a thatched whitewashed stone cottage with a goat in front of it, which was typical of about 99 44/100 per cent of what we saw on the tour. Some of the Irish peasants are so poor that they stay up all night so not incur the expense of a bed and sleep all day so that the cost of meals is avoided. Even the engine was affected by the scenes of distress for the explosions frequently came in broken sobs. Part of this might have been due, however, to the water diluted with kerosene

which was sold to us for fuel. Of course, the scenery was beautiful, but you probably have an Irish neighbor who raves about the Lakes of Killarney or the Giants' Causeway so much that mention of it had wisely be omitted here. The cream of the Irish is in America and one acquainted with the virtues of the race in that part of the world is usually disappointed with the natives on the ould sod.

The Irish sea was next recrossed in a short 2-hours' trip and



*Returning to London after tour of the British Isles. The band escort was accidental but not inappropriate*



the journey southward through western Scotland and England begun, with London as the destination. The "bonnie braes of Scotland" were soon forgotten in the beauties of the English "lake district"—Lake Windermere, Mount Helvellyn, Conistone Water and numerous similar places of interest which are the Mecca of English vacationists. Here the car was put to its severest hill-climbing test by negotiating grades as steep as one in seven. These were in winding up-grade passes where it is impossible to get any speed with safety.

#### Chased by the Police

We tried to get a running start through Ambleside, the home of Wordsworth, for an especially steep hill and were chased by a mounted bobby. In the fall, they are especially stringent about speed limits for there are fewer motorists passing through and the village expenses, paid by fining speeders, remain the same. We had to back up one mountain, but that one was so steep that we wanted to face forward in case we turned a somersault.

Between Lancaster and the borders of Wales there is one succession of large manufacturing towns and mining centers. It was a relief to get from here into the

Shropshire rural districts. Wales contains some of the beauty spots of the United Kingdom so we went into the mountain districts to verify some of the railway literature.

It would be difficult for us to recall the names of the places there, for the Welsh think nothing of scrambling a vowel among seven consonants and pronouncing it without a gurgle. In fact, we were told that the language is so difficult that the Welsh teach their children English first until they are old enough to master the mother tongue. Crossing the River Dee—where dwelt the miller—we began to absorb the rugged beauty of the craggy mountains, the ruined castles where the Britons of old made their last stand against the invading races from the continent, and the isolated valleys hid among the ranges.

#### Shakespeare County Interesting

We merged from rustic scenes into the smooth road leading to the "Shakespeare country" which every American lover of the works of the Bard of Avon must see. As was said of old, "a prophet is not without honor, save in his own country," and the people in Stratford-on-Avon wonder

why about 45,000 pilgrims travel every year to that place to do honor to their erstwhile fellow-citizen. While we cursed old William's memory when we had to learn his "To be or not to be" Hamlet soliloquy, we felt more charitable towards the poet when we beheld the slab covering his remains in the old Stratford church. Could he have cashed in on his prolific works in those days as George Cohan and others do today, hemight have started the theatre trust before Klaw & Erlanger's birth certificate was signed.

#### Visit to Oxford University

Oxford University made us halt next as the day we arrived was "first day of school" at the historic institution. A learned-looking person there did us the honor of mistaking us for a Rhodes scholar for which favor we took his picture in front of one of the college buildings. Examinations are given at Oxford only once in the 3-years' course which made us wonder why so many students went to American colleges. For fear the college environment would make us feel homesick, we hurried on to London where on Piccadilly, we could forget wife and happy home.

## Lincoln Highway Association Reports Progress

### Work Accomplished Discussed State by State

**D**ETROIT, Mich., March 14—A report to the directors of the Lincoln Highway Association which is a recital of known accomplishments since the first meeting of the organization committee a year ago was presented recently and goes into detail as to the organized effort in behalf of the Lincoln highway from coast to coast in general and by states.

It is hard to realize to just what large extent this great trunk highway project has grown until the voluminous report indicating what has been done is perused. Action of one form or another in every state through which the road is to go indicates a healthy interest, and the results thus far are gratifying to the association.

The Lincoln Highway Association took offices in the Dime Savings Bank Building, in this city in June last, and on September 14 the announcement of the route from New York to San Francisco was made by proclamation. On October 8, the first public Lincoln highway meeting was held at Central City, Neb., while on October 31, the route was dedicated. This was marked by parades, bonfires, public meetings, and the like, along the proposed route. Today, the sentiment for the highway is tremendous, and success eventually seems certain.

#### New York

Taking the results by states, New York has evidenced its interest by inviting Secretary A. R. Pardington, of the association, to meet its governor in the near future, following which he will issue a

proclamation, contribute and so on, it is said. In addition, the city planning engineer of New York city has prepared plans for a \$150,000 memorial arch in Madison square; typifying the eastern terminal of the great road. The board of estimates and apportionments of the city has referred the matter to the city planning commission for consideration and report.

#### New Jersey

In New Jersey, public meetings have been held in Jersey City, Newark and Trenton. The plank road between Jersey City and Newark has been reopened December 13, and renamed the Lincoln way. The cost of reconstruction of this section of the Lincoln highway was in excess of \$1,125,000. Much local agitation in New Jersey also has been the rule.

#### Ohio

Ohio has seen much activity for the highway. Across this state less than 100 miles remain to be marked. State Highway Commissioner Marker of Ohio approves the highway plans and is being kept advised weekly as to what is being done in his state.

#### Indiana

In Indiana, public meetings have been held in half a dozen cities, and are being arranged for in a number more. Agitation for and by the association has resulted in petitions for concrete roads in three counties of Indiana. The bids are being advertised, and the contracts probably

will be let for two of them during this month. The agitation in this state has also resulted in much political activity toward the introduction of a bill into the state legislature providing for a state highway commission similar to that of Ohio.

#### Illinois

The work for the Lincoln way in Illinois has also been very extensive. The newly organized state highway commission has adopted the Lincoln highway from Geneva to the Mississippi river as state aid route No. 1, and has authorized the expenditure of \$10,000 of the state funds on a concrete road to be placed at Malta, where the road conditions are impossible. The commission is much interested in the plan, and hopes the association's success will be immediate or early, in order that it can have justification for putting convict labor along the state aid route No. 1. The commission now plans five camps of these convicts during 1914. Public meetings, marking of the route and other forms of boosting are well advanced.

#### Iowa

The state engineer of Iowa has begun work on the Lincoln highway to the extent of broadening and straightening it and insisting that all culverts be constructed not less than 20 feet wide. He reports that but one bridge—Jefferson—requires reconstruction of concrete, when every bridge and culvert across the state will be of that type of construction or at least pro-

vided for. A number of reports of hotels in Iowa contemplating enlarging their accommodations have been received.

#### Nebraska.

In Nebraska every town and county along the route has a local representative, in the majority of instances these being bankers. But the greatest work in this state accomplished by the association is the impetus given to the negotiations now under way, instituted by the Union Pacific Railroad, looking towards the segregation of hundreds of highway crossings and grades across the state. Despite years of agitation for this result, the accomplishments were negative until the route was marked and the number of crossings accentuated. The work in this respect will be going on for the next 5 years, all having to do with the broadening, straightening and beautifying of the Lincoln highway, and making travel safe.

#### Wyoming

The conditions prevailing in the state of Nebraska with regard to the Union Pacific Railroad prevail also to a modified extent in Wyoming. The state highway department, following correspondence with the Lincoln Highway Association, now is undertaking to lay out what will be known as a permanent state aid route of the Lincoln highway entirely across this state. The county commissioners of some of the counties already have gotten together, selected the route and recommended it to the highway commissioner of Wyoming for approval for incorporation within the state highway system.

#### Utah

In Utah the governor has expressed unqualified approval of the plans of the Lincoln highway, and has offered the fullest co-operation with the association. The Rocky Mountain Bell Telephone Co., with headquarters in Salt Lake City, now is surveying a pole line to parallel the highway. This applies to Nevada as well. In Utah the agitation to divert the route from the selected one south of the lake to a route north of it has been most active.

#### Nevada

Nevada also is very much interested. One county has voted a \$50,000 bond issue, the proceeds of the sale of these bonds to be expended on the Lincoln highway. In Nevada also the activity for the route north of the Great Salt Lake has been keen.

#### California

Much interest has also been aroused in California, the Automobile Club of Northern California, with headquarters at San Francisco, having just appropriated the funds and employed painters to mark the road from San Francisco through to the Nevada line. Eighty-five per cent of the route through the state is said to be constructed in good shape. The California state highway department has arranged to put down experimental stretches of different types of material in order that it might determine the best type for future

use. This determination followed the announcement of the route, and also followed the realization of the great volume of motor traffic which it is expected will visit California next year.

#### Colorado

The Denver News reports that 300 good roads enthusiasts met some time ago in Fort Morgan, Col., and organized the Northeastern Colorado Lincoln Memorial Good Roads Association, with the idea of developing and improving the roads from Julesburg, via Greeley and Fort Morgan, to Denver. It is also reported on good authority that since the Lincoln highway was marked to Cheyenne, 75 per cent of the traffic which ordinarily went to Denver via Julesburg, Greeley and Fort Morgan, now goes directly to Cheyenne.

#### Maryland

In Maryland an interesting situation has arisen. The Automobile Club of Baltimore, the Merchants' and Manufacturers' Association and the City Wide Congress, all have passed resolutions demanding:

The Lincoln highway be extended across the Mason and Dixon line.

To go through Baltimore and Washington.

Congressional investigation as to how and why the route was selected to leave out these two cities.

That the directors of the Lincoln Highway Association reroute the highway to include these two cities.

That a committee representing Baltimore citizens go to Washington and interview their state senators and representatives, with the idea of having such investigation started.

From the report, summary of the most

important features of which has been given above, it must be evident that the highway is to be a reality at a not far distant date.

#### MONARCH SIX AT \$1250 BILLED

Detroit, Mich., March 18—Special telegram—Believing that there is a demand for a low-priced six, the Monarch Motor Car Co. announces that it will add such a type to its present output of fours. The new car will list at \$1,250 and weigh 2,400 pounds complete. The new Monarch will retain the same general lines as the four-cylinder type which was brought out last year, the hood being lengthened somewhat and sloping to the front, the radiator being placed underneath and ahead of the motor. The power plant will be a 3½ by 5 unit type, and electric starting and lighting will be fitted. The wheelbase is 118 inches and the standard body a five-passenger. The first car will be on the road next week and it is expected that deliveries will commence in April in modest quantities to meet the demand.

#### FORD WINS ENGLISH SUIT

London, March 16—The Ford Motor Co. has won a suit against J. Armstrong, a Piccadilly agent, for \$6,250 for selling its cars for less than \$750 to the British motor car owners' combination. This establishes the right of the Ford company to fix a minimum price at which its cars may be sold in this country. The court held that the Ford company was entitled to collect penalties if its minimum prices had been undersold, and judgment was given accordingly.

## Drake Finishes Second World's Tour

### Hupp Official Recounts His Experiences

**D**ETROIT, Mich., March 14.—Joseph R. Drake, vice-president of the Hupp Motor Car Co., has just returned from a 17 months' tour of the world, principally in the interests of the export business in Hupmobiles. This is the second tour of the kind which Mr. Drake has made, and he is perhaps as experienced in the ways of the orientals and peoples of the antipodes as any. Much of his travelling was naturally done in cars of the Hupp make, and some of his experiences in far-off lands with the motor car are of story-book interest.

Mr. Drake left this country from New York a year ago last fall in time to be present at the Olympia show of 1912 in London and again set foot on United States soil on February 3, returning to the factory here on March 9. His travels took him through parts of France and Italy, and from Naples he went to Ceylon, then later to Bombay, India.

Mr. Drake's journeys in India totaled

about 5,000 miles, mostly over the roads, which he describes as being some of the finest in the world. The Malay states, Australia, the Philippines, China, Japan, New Guinea, Tasmania, New Zealand, and Hawaiian islands were visited by the American. His car was the first to enter German New Guinea, and naturally the natives were much excited over the "steamer belong bush," as they called it, and they examined it with interest.

Speaking of trade conditions, Mr. Drake states that due to the growing popularity of the American car in Australasia, it is getting to be a lucrative field. In Australia, in particular, the American product is exceptionally well received. In most of these countries, the roads are fine, and even the smaller dots of land are wonderfully well supplied with them. Ceylon, for instance, is called the paradise for motorists by Mr. Drake. Our roads are not up to the standard set by even these smaller countries, he says.





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## Let Us Have Truth

THE recent show circuit has developed with many car owners a feeling of suspicion that representatives of various accessories at these shows have been overstepping the line marking the boundary between truth and falsehood. The demonstrating salesmen in the exhibit booths at the shows have been too enterprising in their stories of economy, reduced weight, and efficiency in connection with their respective products. Occasionally their statements have been so absurd that instead of creating a favorable impression concerning their products they have developed a spirit of antipathy.

THE minor show circuits have shown certain examples of gasoline economizers which the salesmen have gone so far as to give an oral guarantee of saving 40 per cent of the fuel after the attachment of the device. In some cases they have gone still further, being bold enough to put the economy factor at 50 per cent. Some have guaranteed to make a car previously going 18 miles per gallon go 30 miles per gallon. Motor Age has no thought of impeding the rapid introduction of any devices that will work for fuel economy, but rather for 9 consecutive years has championed the cause of fuel economy and reduced car weight and at this time is heartily in accord with any movement for the merchandising of any accessory that will make a gallon of gasoline take a car more miles than formerly, but is diametrically opposed to injudicious statements on the merits of some of these products.

SO frequently these statements are grossly misleading. Let us have an official test of these economizers. Have some of our promoting organizations run a motor 1 or 2 hours at

different speeds without such economizer; and follow up this test with the same motor and the same carburetor and the same load and temperature conditions with the economizer attached. Let us get in this way accurate figures on the merits of these devices. Let us have official reports of the economy effected, and let these reports show the nature of the economizer, its construction and every other detail connected with its design and operation. Let us stop this flood current of general assertions that have characterized our national show circuit as well as many of the minor show circuits and get the real facts.

LET us go one step further in these official tests. This is a period of power tire pumps. New designs are being brought out every month and there are glib-tongued stories told by salesmen and demonstrators as to the merits of these respective pumps and as to the number of minutes required to inflate different sizes of tires to certain pressures. From actual figures including bore and stroke of these power pumps and the speed they travel as given out at the shows it is positive that some makers are not telling the whole truth. In a tour from exhibit space to exhibit space the show visitor meets with conflicting statements. Such statements are not for the good of the show in general and are disastrous to the power tire pump. An official report of such pumps would at least give motorists true information on their ability to inflate. Let such a report go further and take up the question of lubrication in these pumps, the possibility of attaching them to cars already in use as well as the expense connected therewith, and the temperature of them after considerable running. All of these facts would be welcomed by car users and the industry in general.

## Care of the Storage Battery

THE owner who put his car away during the recent snow period should not neglect those necessary precautions of taking care of the storage battery used for starting and lighting. It is not good for such a battery to be left for long periods in a totally, or nearly totally, discharged condition. Rather, the battery should be taken out and fully recharged at once. A storage battery is different from a gasoline tank or radiator in a car. A gasoline tank can be left empty all winter and no damage is suffered. A radiator can be left empty all winter without any damages, but a storage battery is different. It is not an empty vessel which is filled occasionally with electric current, as is the gasoline tank with fuel or the radiator with water. Rather, the storage battery is a chemical unit, and not merely a receptacle.

THE storage battery must be charged regularly, the same as it is necessary for a human being to eat regularly. If human beings do not eat they starve, and if storage batteries are left for long periods in highly discharged conditions they, too, literally starve and permanent damages may result from such neglect.

MANY makers of late have realized the necessity of having the storage battery given every attention and when shipping the battery to the dealer in the car the electrolyte is left

out; in other words, the battery is dry. The precaution is taken of sticking over the filler in the gasoline tank a notice to the effect that the battery is dry and cannot be used until electrolyte is added, this notice being so posted as to be read before gasoline can be put into the fuel tank. In this way the battery is protected from any possible injury. What the car maker avoids by this precaution the car owner must avoid during the winter season, and while those whose cars have been in dead storage all winter have taken all of the necessary precautions, it frequently happens that many who put their cars away for a month or 6 weeks suffer considerable battery damage by their carelessness. This is particularly so where the battery is in a nearly discharged condition.

IT is not enough to know when the battery requires charging, for one must also know how to properly charge it. Just as man's body is injured by overeating, so battery plates are injured by overcharging. The excessive heat generated during the overcharge period is enough to cause the positive plates to buckle and a severely overfed battery is hopelessly beyond repair. Just as a child requires watching while it is eating, so a battery must be examined from time to time during the charging period. The child unknowingly may eat too quickly. The current going through the battery may generate too much heat which means the battery must be taken off charge to cool.



# Wisconsin's First Motor Car Was a Product of 1871

The Spark, a Steam Vehicle, Invented by Dr. Carhart

By S. E. Austin



**A**LTHOUGH the motor car is looked upon as essentially a development of the last decade, in reality it first made its appearance in America nearly half a century ago.

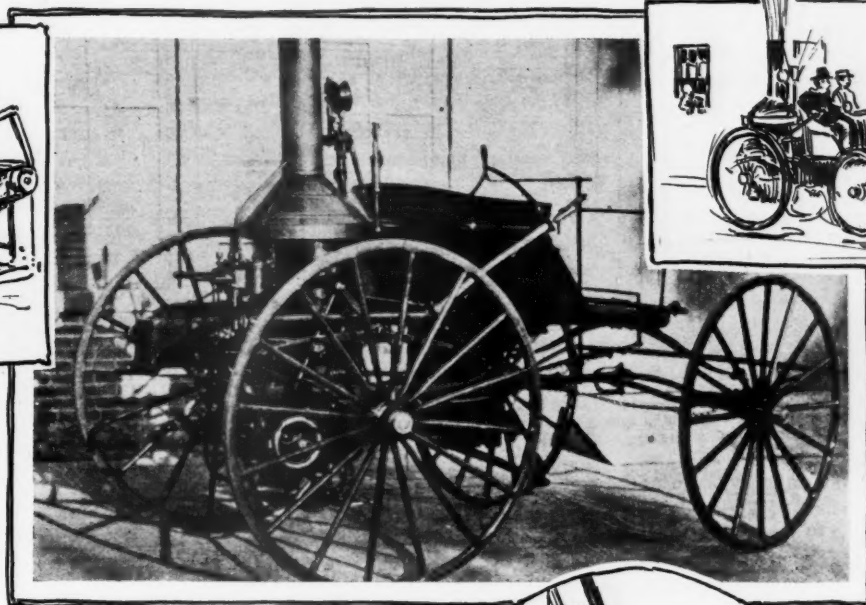
As early as September, 1871, Dr. J. W. Carhart, then pastor of the First Methodist Episcopal church of Racine, Wis., had built and operated a power-propelled vehicle upon the streets of his home town. The Spark, as it was called, was a steam vehicle, and upon its initial tryout, with two passengers, the inventor and his son attained a speed of something more than 10 miles an hour. It was the first self-propelled road vehicle to appear in the western hemisphere, it is claimed, and antedated the invention of Serpollet's machine by approximately 17 years. Consequently America may claim to share with France, the laurels of pioneer work along these lines.

## Dr. Carhart Now in Texas

Dr. Carhart now is a practicing physician in San Antonio, Texas. He is 80 years of age, and has lived to see his early work taken up and carried on by others until it has become one of the most important industries of a great industrial nation. Sitting in his office, recently, the aged inventor told his interviewer the story of the building of the Spark, of the innumerable difficulties encountered and overcome, and of its first triumphant appearance.

"Wait a moment," he said, "and I will show you a picture of the machine."

The doctor rummaged in his safe among piles of scrap-books and newspaper clippings and at length produced the faded photograph that is shown herewith. In appearance it resembled closely some of the early locomotives that sprang from the brain of Stevenson, possessing a small, upright boiler and a pair of slide-valve engines, the whole mounted upon high, steel-



THE SPARK MADE IN 1871

tired, old-fashioned buggy wheels 4 or 5 feet in diameter.

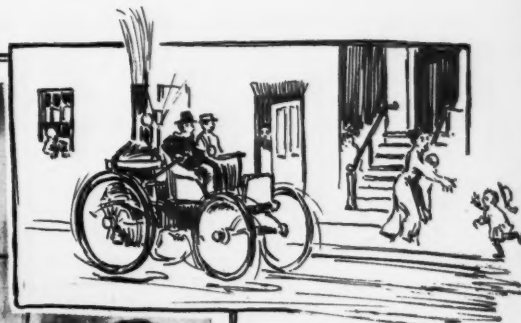
"The boiler," said Dr. Carhart, "was of 15 or 20 gallons capacity and could operate under a pressure of as high as 200 pounds. The engines were  $2\frac{1}{2}$  by 3-inch bore and stroke, and although I never tested them carefully, I imagine they developed between 3 and 4 horsepower. Each drove its wheel independently of the other, thus doing away with the necessity of a differential upon the rear axle. Two trains of reducing gears were used to transmit the power. The engines were fitted with link motion, which permitted reversing. Steering was accomplished by means of a chain and drum gear, which turned the entire front axle. The long steering lever can be plainly seen in the illustration.

## Helped by George Slauson

"Although I conceived and built the Spark, much of the credit belongs to George Slauson, a wealthy resident of Racine, since deceased, who financed the undertaking; also to my brother, H. C. Carhart, now professor emeritus of Michigan State University, who made all the working drawings.

Incidentally, Professor Carhart's text books upon physics now are used in many of the public schools of the country.

"As nearly as I can remember," the inventor continued, "it was early in Sep-

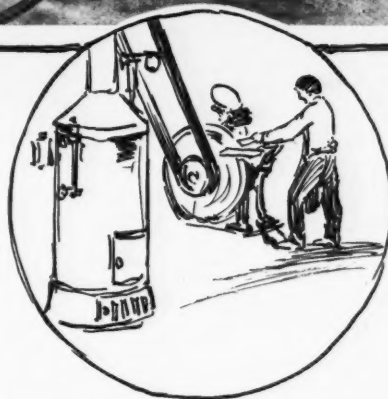


tember that my son, now a banker in Panhandle, Texas, and myself went out to the barn and fired the machine up for its trial trip. As we turned into the street, I steering and my son wielding the poker, which formed a very necessary part of our touring equipment, the entire town rushed out of doors to see what was happening. The noise of the exhaust, which escaped through the stack, and which shot smoke and cinders fully 15 feet

into the air, was terrific and startling.

## The Spark a Noise-Maker

"Since then I frequently have heard the cannonading of racing motors lined up for the start, but, frankly, even Disbrow's Jay-Eye-See could not compare with it for genuine peace-disturbing qualities. Of course, the steam whistle with which it was equipped did not tend to make matters any better. In fact, it was not long before we had the street entirely to ourselves, for, when they had seen it, the citizens were unanimous in predicting that the Spark would blow up. I think it was due to this fact," the doctor added, whimsically, "that there were only a few runaways and no casualties connected with our premier appearance. However, during the months that followed my neighbors, and even the city-bred horses, became used to the machine, and the period during which I held undisputed right of way was comparatively short. Recently J. S. Donald, secretary of state of Wisconsin, was quoted in the papers as saying that there were several indignation meetings held by my parishioners on account of my 'horse-



less carriage,' but if there were, I never heard about them.

"We experienced many difficulties in building the Spark. One of the greatest, in fact, one that threatened to wreck our entire enterprise, was in obtaining a source of power for the lathe which Mr. Slauson had purchased and set up in his barn. At last, however, I rigged up a treadmill, and after I had borrowed a riding pony from one of my Sunday school scholars, the question of power was solved. We worked the pony day and night, and although he since has been superseded in popular favor, no one can say that the horse did not have a great deal to do with the success of at least the first American motor car. But, even so, the casting and the heavier milling had to be done in especially equipped foundries. It is quite a coincidence that those of the J. I. Case Threshing Machine Co. was selected—a firm that has since become world famous for its motor cars."

#### No Patents Taken Out

The inventor did not take out any patents upon his car, nor did he apply for any portion of the \$10,000 bonus which the state of Wisconsin offered, shortly afterwards, for the invention and development of "a horseless vehicle that could successfully complete a 200-mile journey, as nearly as possible in a north and south direction, within the confines of the state." He was content merely with the joy of work. Five other inventors, however, claimed bounties amounting to \$5,000 apiece some years later. One of these, Hans Farrant, builder of the famous Oshkosh steam carriage, was closely associated with the Methodist clergyman in the building of the Spark.

The end of America's earliest motor car was unromantic, for soon it was dismantled and utilized as a power plant for a job printing establishment run by the inventor's sons. Later the business was sold and all that remained of the premier power wagon with it.

In the meantime its inventor has been practicing medicine and preaching the gospel in southwest Texas for nearly half a century.

#### VULCAN GEARSHIFT TRANSFERRED

Milwaukee, Wis., March 16—The manufacture of the Vulcan electric gearshift, up to this time made and marketed by the Vulcan Motor Devices Co., Philadelphia, has been taken over by the Cutler-Hammer Mfg. Co., Milwaukee, Wis. The latter concern will operate a new department in its plant, to be known as the Vulcan electric gearshift department and will continue building the device which is in use on the Haynes, Pullman, S. G. V. and Norwalk cars, under the Vulcan patents. Roger W. Griswold, president of the Vulcan company and W. A. McCarrell, chief engineer, will continue their activities in the construction and sale of the Vulcan gearshift.

## Third Annual Tour of France Now On

### Thirty-Three Cars in Big Reliability

PARIS, March 2.—Out of thirty-seven entrants, thirty-three cars left Paris today for a 3,000-mile loop right round France. This is the third annual tour of France, and comprises thirteen stages varying from 200 to 300 miles each and a dozen hill-climbs or short-distance speed contests in various headquarter towns.

The first stage is Paris to Boulogne; from here the competitors will work down the eastern frontier to Nice, come up the center of France to Clermont-Ferrand, run south to Toulouse, pass along the entire length of the Pyrenees, travel along the Atlantic seaboard, and from Havre will double back to Paris. They will reach this town on March 25.

Before leaving Paris every essential organ in connection with the car was sealed. If a seal is lost, the car is disqualified. Disqualification also follows if the average of 10 miles an hour is not observed on each stage of the tour. To prevent speeding, an official car will set out ahead of the competitors, and it is forbidden to pass this pacemaker. The real classification will come as the result of the various hill-climbs, the short-distance speed tests, and a 60-mile race at Le Mans, in which every car must take part. This is a new feature and is responsible for a special class of machine being entered, and particularly for a special type of equipment in the tours.

The regulations allow any touring model of not more than 183 cubic inches cylinder area to start in the tour. A comfortable two-seater body is obligatory and fittings must include fenders, running boards, top, windscreen, lamps and headlights.

#### Speed Determining

As speed is the determining factor, at least three-quarters of the competitors have tried to dodge the rules. There is only one closed car in the tour and only two with a four-seater body. The rest are very light, streamline cars with fenders cut down to the narrowest dimension, running boards higher than the hubcaps, and disappearing tops and windscreens.

Albert Guyot has the most extreme example. His car is a Martini with four overhead valves per cylinder, a pointed radiator, and a scuttle dash. The windscreen is mounted on telescoping tubes within the body. When lowered, it disappears entirely; when raised, it stands about 4 inches above the top of the scuttle, but even then its supports are internal. The top is of such a size that it only covers the men's heads, leaving their shoulders exposed. It fits into a shallow recess around the bucket seats and is covered over by leather flaps, there being no projection whatever. The seats are staggered

to decrease width and the car has a pointed tail.

Nearly all the manufacturers have put in their sporting type models. These are cars with high-speed motors developing from 45 to 56 horsepower, although not exceeding 183 cubic inches. As they figure on the catalog, they are eligible to start, although not being pure touring mounts. A feature of the competition is the number of really small cars, which in nearly every case are standard models with more or less standard body work. The smallest is the Mathis of less than 61 cubic inches cylinder area. There are four cars not exceeding 91 cubic inches, and seven in which the cylinder area does not exceed 122 cubic inches. In this class are three Bellenger cars with Knight motors. These are the smallest Knight motors made in Europe. Four cars do not exceed 146 cubic inches; ten are in the 168 cubic inch class, and seven are just within the maximum of 183 cubic inches.

#### Buick in the Tour

The longest stroke in the competition is 5.9 inches, for a bore of 3.1. The highest stroke-bore ratio is 2 to 1; the average is 1.6 to 1; the lowest is a Buick with a square motor of 3.7 inches. There are two of these models in the competition, both of them being specially equipped with a view to speed and having special racing camshaft and light reciprocating parts. These are the only American cars in the tour. The following is list of competitors, all the cars having four-cylinder motors:

#### LESS THAN 61 CUBIC INCHES

	Bore and-Stroke
Mathis .....	.56 by 100 mm.

#### LESS THAN 91 CUBIC INCHES

Ponette .....	.63 by 120 mm.
Bugatti .....	.58 by 100 mm.
Alva .....	.64 by 115 mm.
Phoenix .....	.62 by 124 mm.

#### LESS THAN 122 CUBIC INCHES

Scap .....	.67 by 130 mm.
Aquila-Italiana .....	.70 by 120 mm.
Bellenger (Knight) .....	.74 by 114 mm.
Bellenger (Knight) .....	.74 by 114 mm.
Bellenger (Knight) .....	.74 by 114 mm.
Majoda .....	.75 by 112 mm.
Phoenix .....	.67 by 140 mm.

#### LESS THAN 146 CUBIC INCHES

Gregoire .....	.70 by 140 mm.
Gregoire .....	.70 by 140 mm.
Scap .....	.75 by 130 mm.
Zedel .....	.74 by 120 mm.

#### LESS THAN 168 CUBIC INCHES

Buick .....	.95 by 95 mm.
Buick .....	.95 by 95 mm.
Aquila-Italiana .....	.80 by 130 mm.
Aquila-Italiana .....	.80 by 130 mm.
Hispano-Suiza .....	.80 by 130 mm.
Hispano-Suiza .....	.80 by 130 mm.
Diatto .....	.80 by 120 mm.
Diatto .....	.80 by 120 mm.
Georges Roy .....	.80 by 120 mm.
Georges Roy .....	.80 by 120 mm.

#### LESS THAN 183 CUBIC INCHES

Barre .....	.80 by 150 mm.
Barre .....	.80 by 150 mm.
Barre .....	.80 by 150 mm.
Pierron .....	.80 by 150 mm.
F. A. B. .....	.82 by 120 mm.
De Bazelaire .....	.80 by 150 mm.
Martini .....	.85 by 132 mm.



# Record Attendance at Boston Show

## More Than 245,000 See Eastern Exhibition

By J. T. Sullivan

BOSTON, Mass., March 14—Once more new figures have been made for the Boston motor show. And again it has been impressed upon motor makers who follow conditions closely that the Boston exhibition is the real selling show of the season. As a result no one hears any rumors of a discontinuance of the show among the dealers, but rather those not members of the Boston Automobile Dealers' Association are clamoring for admission. There are more applications on file now than ever before, and if the directors wish to enlarge their organization there will be little trouble in doing it. The rule that a man must have been in business continuously for an entire season or approximately a year either as an agent or a manager of a branch keeps out those who would like to jump in just before a show.

In the matter of attendance new figures were made. Just how large these were could not be determined tonight, for it will take a few days to complete the count, but it will exceed the 245,000 of 1913. When the show was half over on Wednesday night the figures for the same 3 days of a year ago were exceeded. One of the surprising things was that on Wednesday night, society night, when the price was doubled, the attendance had run up above 45,000, a new figure. This was thought to be the record, but on Thursday there were more people present, the management stated. Even Saturday the jam continued up to the last minute. It was surprising to see the large number lined up as early as 9 each morning waiting to get into the show. And by 10:30 each morning there were enough at the show to comfortably fill the building.

### Many Car Sales Made

The dealers are all happy over the outcome. There were many cars sold, the greater number, of course, being small cars. A number of dealers from various New England cities and towns closed up orders with people that promised to see them at the show. And the Boston dealers did a good business. Bonafide actual sales for the week should total at least 1,000 machines. The writer moved about and asked questions here and there as to sales. He found that about everyone had sold something. The National agent advertised that eighty-nine sixes were sold by him and his agents. The Oakland had sixteen orders before Wednesday. The Hudson had thirty sales by Thursday night. One of the Ford men was authority for the statement that 102 sales were recorded at noon Friday. The Pathfinder sold five roadsters and a big touring car to a cigar firm on Monday, the big car for the owner and the roadsters for the sales force. The Chalmers orders exceeded a year ago, and the new Jeffery cars also were good sellers. In the big-

car class the average for the week was about two a day, which is very good, considering the prices and the condition of the money market. The dealers also got a lot of fine prospects and if they do not close up sales it will be for lack of real salesmanship.

### Interest in Cyclecars

There was a big boom in the cyclecars. Boston had fourteen machines represented, a larger number than at any other show. These fourteen comprised the Duryea, Merz, Trumbull, Bantam, Salvator, Economy, Euclid, Laconia, Twombly, Mercury, LaVigne, Imp, Dudly and Cricket. Apparently New Englanders are going to go crazy over them, judging by what was accomplished during the week. A few weeks ago there was one cyclecar represented here, the Imp, and now that the show is over every one of these fourteen have closed up agencies for Boston and vicinity. The orders booked will keep the factories on the jump trying to fill them. Moreover, New England intends to make a bid for the building of these cars, for of the fourteen shown six are made in New England, and there are plans under way for more makes here. These six comprise the Bantam and Salvador made in Boston; Economy at Providence; Trumbull at Bridgeport; Euclid at West Haven; and Laconia at Laconia, N. H.

The Cyclecar Club of New England was launched here during the week by representatives of the fourteen machines that were displayed at the show. There were twenty-one representatives present and much enthusiasm was manifested. It was decided to have not alone a permanent organization, but also a clubhouse. Dr. Charles G. Percival was made chairman of the meeting and the election of officers resulted in the following men being chosen: E. P. Blake, Imp cyclecar, president; H. Ross Maddocks, Twombly, first vice-president; C. J. Fischer, La Vigne, second vice-president; C. S. Roberts, secretary; A. E. Kenny, treasurer; F. J. Tyler, J. S. Richards, F. S. Corlew, A. C. Gosse, Joseph E. Green, directors. Rooms will be secured at the Hotel Oxford.

It is planned now to have a series of cyclecar shows throughout New England. Arrangements are being made for one in Worcester, another in Springfield, and a third in Providence. Plans will be mapped out so that the cars will tour from one city to another, have a show during the day and evening and then move on like a circus visiting the principal cities in all the New England states. Committees will also be appointed to conduct runs and tours during the summer so that the interest in the product will be kept up.

A representative of the accessory asso-

ciation was at the show, it was said, with a notebook jotting down the names of firms which disregarded the organization's ban on the Boston show, and the outcome will be watched with interest.

A number of the dealers have arranged to keep their cars and chassis for a week or so and as a result there will be local shows in the salesrooms all next week.

### BOSTON TRUCK SHOW OPENS

Boston, Mass., March 17—Special telegram—Boston's annual motor truck show opened tonight and was well attended. It is not such a large exhibition as a year ago. In 1913 there were fifty-nine different makes exhibited. In this show the exhibitors of commercial vehicles number thirty-seven, just thirty-two have dropped out, and ten new ones are in.

When the doors were thrown open there were 140 machines in the building and it is expected that a few more will be added tomorrow. There are three electric makes this year. Last year there were eight. Last year there were close to 200 trucks on view. The Boston Commercial Vehicle Dealers Association is conducting this week's show. Everything from a small cycle car parcel delivery vehicle to the big 5-ton truck is shown, also many pieces of fire, police, hospital and other public vehicle apparatus.

The makers exhibiting machines this year comprise: Autocar, Andover, Atterbury, Alma, Buick, Buffalo electric, Chase, Federal, Garford, G. M. C., I. H. C., Jeffery, Kisselkar, Kelly-Springfield, Knox, Lauth-Jurgens, Locomobile, Little Giant, Merz, Mais, Overland, Packard, Pierce-Arrow, Parcel Post, Palmer-Moore, Reo, Republic, Selden, Stanley, Stewart, Standard, Universal, Willys, Utility, White, Walter, Velie and Twombly.

### ARGO MOTOR PLANT FOR RACINE

New York, March 16—The Argo Motor Co., Inc., organized by Benjamin Briscoe to build a small car for \$295, has selected a plant out in Racine, Wis., where it will build its motors and transmissions. This plant formerly was used by the G. W. Jagers Co., and has a capacity of about 125,000 square feet. About \$35,000 worth of special machinery will be installed. The company will manufacture about 10,000 motors this year, and expects to double this output for 1915. The radiators will be built at the Briscoe plant in Jackson, Mich. The cars will be assembled here in the east, near this city. The company has a few factories in view, but has not as yet decided as to which one it will take. It is expected that the first model of the Argo company will be seen on the streets in the near future.

### ECCLESTON QUILTS OAKLAND

Detroit, Mich., March 16—The resignation of J. B. Eccleston as general sales manager of the Oakland Motor Car Co., of Pontiac, is announced. His successor has not been announced as yet.



# Santa Monica Wants to Travel in Single Harness

## Beach City Thinks It Can Promote Races Alone

**C**HICAGO, March 14.—War threatens between the Western Automobile Association and the city of Santa Monica, and it may be there will be a division of interests which will result in Chairman Shettler and his colleagues picking out some other course over which to run their road racing classics. Indeed, matters have gone so far that Shettler declares he is going to open negotiations with several owners of big tracts of land in the vicinity of Los Angeles in an effort to find a location where an 8-mile course can be laid out on private property. If this is found, and the deal goes through, Santa Monica and the Western Automobile Association will part company.

### Santa Monica Ambitious

All this trouble has come about since the running of the Vanderbilt and grand prix, so advices from Los Angeles state. It seems that Mayor Dudley of Santa Monica has come out in interviews and declared that Santa Monica is big enough to handle the classics without the help of the Los Angeles contingent, and urging the formation of a Santa Monica association for the purpose of handling future road races like the Vanderbilt. Inasmuch as the Western Automobile Association is credited with having the inside track with the Motor Cups Holding Co., it is figured out that Santa Monica would have hard sledding getting along without the W. A. A.

It is claimed that Mayor Dudley does not represent the real feeling in Santa Monica and that he is not entitled to much credit for the success of the recent meet. The W. A. A. says that E. Lillingston, president of the Santa Monica chamber of commerce; F. J. Townsend, chairman of the finance committee, and Chief of Police Randall were the ones to really help. Also it is pointed out that Santa Monica has profited greatly through the running of the classics over its course. In the first place, the city did not have to assume any financial responsibility, the \$10,000 guarantee fund demanded by the Motor Cups Holding Co. being given by ten residents of Los Angeles. Besides this, the meet resulted in the roads being put in the finest kind of shape and in addition Santa Monica will realize something like \$10,000 or \$15,000 profit from the meet.

From this distance it would seem as if Santa Monica could not get along without the Western Automobile Association, whereas the latter, with all the prestige it has obtained, easily could find some other course just as good as Santa Monica. It is thought, though, that the Santa Monica mayor will be made to see the error of his way by his fellow citizens and that the present storm will be only a tempest in a teapot.

Of interest is the report issued by Chair-

### By C. G. Sinsabaugh

man Shettler as to the attendance and gate receipts at the Santa Monica meet. Cold figures cut down the enthusiastic estimate of the newspaper men who declared that at least 100,000 attended each day. Chairman Shettler says:

The Western Automobile Association has today issued checks for the additional \$5,000 prize money which was divided as follows: Twenty-five hundred to the winner of the Vanderbilt cup race and \$2,500 to the winners of the grand prize.

The gross receipts for the Vanderbilt cup and grand prize races held over the Santa Monica course February 26 and 28, respectively, amounted to \$47,430. According to our contract with the Santa Monica Bay Chamber of Commerce we were to be allowed 50 per cent of the gross receipts which, in addition to the entry fees, would constitute the purse for the two races up to a total of \$20,000. All money over that amount was to revert to the Santa Monica Bay Chamber of Commerce for the expense of running the races, with the exception of 10 per cent of the gross receipts, which was to be paid this association to cover our office expenses, publicity account, expense of securing the entries, etc., etc.

Knowing as we do about the percentage of people who saw these two races without paying for it and being cognizant of the exact number of people taken to the course via street cars; knowing the exact number of motor cars that attended the races and exact number of complimentary tickets given to the residents of Santa Monica, newspapers, etc., we have no hesitation in making the positive statement that not more than 60,000 people witnessed either the Vanderbilt cup or grand prize race, which may be surprising to the average spectator. To be perfectly frank, it was a surprise to us, and can only be accounted for by the fact that the postponement of these races, while it was of some benefit to the grand stand sale, worked a great hardship on the general admission sale.

### Barney Oldfield's Plans

There seems to be plenty of guessing relative to the makeup of the Maxwell team which will be selected by Ray Harroun. Barney Oldfield's name is the one most conjured with, but up to date the former speed king has not made any definite promises, although he admits he is corresponding with the Maxwell people. Barney is anxious to get hold of a foreign car and he is said to have his eye on a Mercedes. The Stutz company also is after him and a statement to this effect was made by the Stutz company this week.

The Stutz company is building three new racing cars for the 1914 campaign, being satisfied to relegate the two cars raced by Cooper and Anderson during the 1913 season to minor events. If Oldfield is secured there will be three Stutz entries at Indianapolis, with Cooper and Anderson as the other two drivers.

From the Pacific coast comes the positive announcement that William Carlson has been signed by Maxwell, a choice which meets with the approval of all who saw young Carlson drive into third place in the recent Vanderbilt, piloting a Mason. Carlson's work has been on the Pacific coast and it is the boast that he is the only man who defeated Cooper last year. That was when he won the first San Diego road race in a Benz. He also was placed in the Los Angeles-Sacramento road race. He is a clever driver and possesses a per-

sonality that cannot but help make him popular throughout the country.

The announcement of the resignation of Finley Porter as chief engineer of the Mercer company surprised racing enthusiasts, for Mr. Porter long has been a prominent figure in the racing world and the support he has given the sport has been appreciated. E. H. Delling, who succeeds him, also is a believer in racing. At his own expense he built the Delta which ran so well at Elgin last fall, with Joe Dawson at the wheel.

### Foreigners Sail May 9

Boillot, Goux, Guyot, Duray, Chassagne and Christiaens, the six foreign drivers who are coming over for Indianapolis, plan on sailing from Havre on the Provence about May 9, reaching the Hoosier oval May 16 or 17.

### PATTERSON TO RACE A MERCEDES

New York, March 18—Special telegram —E. C. Patterson, gentleman sportsman of New York and Chicago, has today completed arrangements for the entry of a grand prix Mercedes six-cylinder car in the Indianapolis race on Decoration Day and the Elgin road races the last week in August. The car Mr. Patterson has obtained is a Mercedes six built specially for the grand prix race at Le Mans, France, where three of these cars competed last fall. The Patterson car on that occasion was driven by Salzer, who finished fourth, averaging 73.3 miles per hour for the 335.5 mile race.

The motor has cylinders cast in pairs and its piston displacement is 414 cubic inches. The car is chain-driven, has the steering wheel on the right side and is fitted with a streamline body, resembling the Mercedes-Knight entered by Patterson last year in the Indianapolis race and which made one of the most spectacular performances of the classic winning.

At present Mr. Patterson has not decided upon a driver, but has Ralph DePalma and others in mind.

### QUAKERS REFUSE ROAD RACE PERMIT

Philadelphia, Pa., March 13—There will be no road race in Fairmount park in 1914. Disregarding a resolution unanimously passed by select and common councils requesting that the race be held, together with an indorsement of the councils' action by the Market Street Merchants' Association, the Fairmount park commission at its regular monthly meeting this week refused the request of the Quaker City Motor Club for permission to resume the 200-mile race in Fairmount park. The action of the commission was unanimous and was taken without discussion.

# Europe Is Sending Over Its Six Best Race Drivers

## Entry of Duray at Indianapolis Is Assured—Will Drive Little Peugeot

PARIS, March 3.—Arthur Duray will take part in the Indianapolis 500-mile race on Memorial day with the 183-cubic inch Peugeot with which Boillot won first place in last year's Coupe de l'Auto event at Boulogne. Duray is a familiar figure to American racing fans, for he took part in several of the Vanderbilt cup races on Long Island, driving Lorraine-Dietrich cars. Although born in New York city, Arthur Duray is of Belgian nationality and has spent practically the whole of his life in France. He is a race driver by profession and also a certified aviator. His most recent exploit in the motor world is the driving of the 300-horsepower Fiat racer, with which he attained a speed of 142.9 miles an hour. Before sailing for Indianapolis next May, Duray again will drive this car at Ostend in an attempt to beat all existing records.

The 3-liter Peugeot undoubtedly will be the smallest car in the Indianapolis race, for it has a bore and stroke of only 3.7 by 6.14 inches. It is considered the most efficient racing motor ever built, the power curve showing 92 horsepower at 2,870 revolutions a minute. The car has shown a speed of 95.07 miles an hour for the measured kilometer over an ordinary road, and 93.82 miles an hour average for the kilometer timed in both directions. In the last race in which it competed its average speed was 63.2 miles an hour for nearly 400 miles. The entire distance was covered without stopping the engine, and with only one stop of the car in order to allow the driver to take a drink. The course over which this race was run is exceptionally hilly, and the average of 63.2 on such a course really is equivalent to more than 70 miles an hour over medium roads.

Soon after this race at Boulogne the car was purchased by a wealthy French sportsman who has driven it in a few local hill-climbs and done a small amount of touring with it. The owner of the car has entrusted it to Duray for the Indianapolis event. Although not having the same maximum speed as some of the other cars, the fact that the Peugeot can cover the full distance without a stop for tires or gasoline will give it a certain advantage, and Duray may be expected

to finish well to the front in the race at Indianapolis.

According to the Paris representative of the Indianapolis motor speedway, it is believed that the European contingent to visit America next May is now complete. The drivers having put in an official entry are:

- 1—Boillot, grand prix Peugeot.
- 2—Goux, grand prix Peugeot.
- 3—Albert Guyot, grand prix Delage.
- 4—Christiaens, grand prix six-cylinder Excelsior.

- 5—Jean Chassagne, grand prix and world's 12-hour record six-cylinder Sunbeam.
- 6—Arthur Duray, 3-liter Peugeot.

This team undoubtedly is the strongest ever sent across the Atlantic and promises the finest race ever seen in America. Boillot, Goux, Chassagne and Guyot finished respectively first, second, third and fourth in last year's French grand prix, certainly a galaxy of talent.

### FRENCH RAISING CAR TAXES

Paris, March 3.—France needs a few million francs for additional expenditure on roads and is endeavoring to squeeze the amount out of motor car owners. Before its overthrow a few weeks ago, the late government had a supplementary motor car taxation bill before the house and also proposed to increase the rate of taxation under the income tax law when the person owned a motor car.

All the motor car associations are making a very determined stand against increased taxation. It is pointed out that there is no guarantee that the new taxes will be used for the improvement of roads. The government revenue from motor cars has increased enormously during the last 10 years, but the amount spent on the upkeep of roads has remained stationary. It is because of this policy that the road surfaces in France have decreased. As a proof that the amount now paid in motor car taxes is out of all proportion to the allotments for road maintenance, the Chambre Syndicale of Automobile Manufacturers has issued the following figures:

	Receipts from road users	Expenditure on roads
1882 .....	\$ 2,936,375	\$5,207,165
1902 .....	8,898,679	5,207,165
1911 .....	18,073,129	6,100,000

Almost as soon as it got into power, the new government introduced a bill under which a supplementary tax should be put on cars. This is at the rate of \$10 for cars of not more than 12 horsepower, \$15 for 13 to 24 horsepower, \$25 for 25 to 36 horsepower, \$40 for 37 to 60 horsepower, and \$50 for each car of more than 60 horsepower. These proposed taxes are in addition to what is at present paid by the French motorists.



ARTHUR DURAY AND TWO VIEWS OF THE LITTLE PEUGEOT HE WILL DRIVE AT INDIANAPOLIS



# Chicago Tackles Used-Car Problem

## Dealers' Committee on Appraisement Suggested

CHICAGO, March 16—When H. M. Allison, Chicago Packard manager, was inducted into office as president of the Chicago Automobile Trade Association last week he outlined to the members of his organization what is believed to be a new scheme for the handling of used cars—a committee whose duty it would be to appraise the value of the old machines. Such an appraisement would be an association asset also in that this report could be sold to dealers in adjoining cities and towns at a nominal figure and in this way furnish the Chicago association with a big revenue which could be used in carrying on its work in other directions.

President Allison also took up the matter of shop labor and urged an increase of 10 cents an hour over the present 70-cent rate in order that the Chicago dealers may be able to show a profit in a department which usually is run at a loss. His remarks were as follows:

"The used car problem is of more than passing interest to you, and all the members of the association in the gasoline and electric fields probably have wrestled with the problem more than any other one in connection with their business. The subject probably has been discussed more than any other in connection with the industry.

"I am not in favor of this association trying to do the impossible thing—endeavoring to control the allowance and resale of used cars. We cannot do this for a good and sufficient reason—the law prohibits it.

### Schemes That Have Failed

"At different times it has been proposed to form a company by each member investing a certain amount of money and have such company handle all used cars. Personally, I think this is not practical. This has been tried in other cities without success. Competition is the life of trade. You can't expect to solve the most intricate problem of your business by having all used cars handled by one second-hand company. You know from your own experience that you can get better prices for used cars through your own individual establishments than the average company handling exclusively second-hand cars. You can not wish your biggest problem on to some other company to solve. You each must work out your own used car problem in your own way. However, I have a plan I would like to submit for your consideration.

"We have to deal largely with two classes of prospects:

"First. The one who is trying to make a long-trade deal with you to get a part or all of the commission you are entitled to.

"Second. The one who honestly thinks

his used car is worth more than the actual market price.

"To the latter class we can appeal most strongly through this association, and the former class we can make realize that we know, through the association, the value of his used car.

"About 2 years ago, I served on your used car committee, and we recommended at that time the publicity feature, and you adopted same. Since then a large number of our members have filed with the association the allowance prices on the particular make or makes of cars they handle. This was a move, in my opinion, in the right direction, but we have not gone far enough.

### Allison's Plan Outlined

"I propose that each member of the association file the allowances on used cars every 30, 60 or 90 days, and that we have several committees appointed on appraisement. For example: We could have a committee representing all of the electric dealers, with the head of each organization, or the manager of the used car department of each electric dealer's establishment. We also could have committees representing the gasoline cars. For example—one committee for cars under \$1,000; and other committees as follows: For cars from \$1,000 to \$2,000; for cars from \$2,000 to \$3,000; for cars from \$3,000 up.

"These committees should meet monthly and appraise the various makes and models of used cars. If these committees spent, say, 1 day a month on appraisement, it would save members of this association thousands of dollars per year. They would have the allowance prices of the members as a guide. The committee would know whether or not the cars were selling at above or below the allowance prices and they would have the right to appraise them accordingly. When cars of a certain model were not moving, they could analyze the reason, and if it was on account of the price, the appraisement could be lower.

"This would form a guide to each member of the association and could be used to advantage in convincing the prospective purchaser of the real value of his used car.

"We are in the great central market of this country and we should make the best of it by advertising the fact that dealers can secure from the Chicago Automobile Trade Association an appraisement on various makes of used cars, furnished quarterly, at \$10 per year. We should be able to get at least 1,000 dealers to pay us this amount if we will all put our shoulder to the wheel and push the good work along. This would mean \$10,000 revenue to this association.

"If we could get this revenue, we could do some real work on motor car appraisement. The information we could furnish in this way to dealers would be invaluable. Ten dollars per year for such information is a mere trifle. The dealers would save it many times over in convincing owners of the real valuation as established in this great central market for used cars.

"I already have approached some Packard dealers within a radius of 500 miles of Chicago and every one of them have assured me that they would be more than pleased to subscribe this amount for the information our association could furnish. If this plan were approved, and each and all of you would solicit the dealers in the cars you handle, I am sure that you could secure a very large number of subscribers. Dealers subscribing could be furnished by the association, on application, with all the cars for sale on the street of any particular make and model they asked for.

"If we could secure this revenue we could take up another phase of publicity, if you consider it advisable. The association could advertise in a small way in Chicago papers, magazines, or in any way that would show results, making an attractive appeal to the prospective purchaser of used cars to ascertain from our association the appraised value of any used car on the market. This information to be furnished gratis.

"Suppose a prospective customer was figuring on buying a used electric and indicated the make of car and year's model preferred, he could be furnished with the appraisement on this car and at the same time every dealer in Chicago, who is a member of this association, having such a used car for sale, could be furnished with this inquiry and all would have a fair chance to get the business direct. I doubt if the trade association has been instrumental in giving the dealers any prospects heretofore. This might result in attracting many prospects through the association advertising.

### Would Increase Labor Charge

"I want you to consider an increase in our charge to the customer for labor. If we can get some revenue through the sources above referred to, the association can afford to engage an expert to analyze the shop overhead expense and show you what your labor is actually costing you. Cost accounting today is a science in any modern business. In the retail motor car business, it frequently happens that you cannot have expert accounting and you are unable to arrive at your actual cost of labor.

"In the business which I represent, we think we know, by most modern accounting methods, what our labor costs us. We know that during the last fiscal year we lost \$4,000 on productive shop labor when we charged the consumer 75 cents an hour for labor. If we had charged 10 cents an



hour more, we would have changed a deficit of \$4,000 to a \$2,000 profit.

"Are we not entitled to a profit on our labor? Why should we furnish labor at less than cost? Does any other business work for the consumer in such a manner? I say, No. For example, a few days ago, an electrician was fixing the house telephone in my office. I asked him how much per hour he received and he said 75 cents. Now, while he was getting 75 cents for his labor, the company for which he worked had nothing like the overhead in the way of shop facilities that you have in the motor car business. In other words, the space he was occupying was paid for by us but the space a motor car occupies when you are charging from 60 to 75 cents an hour for labor is paid for by you. The company for which this electrician worked charged us \$1 per hour. This profit on labor, no doubt, pays for its small overhead and gives it a profit to which it is entitled.

"Take the jewelry business—for example, Spaulding's. Watches are repaired by piece-work. Clocks, however, are repaired at the rate of \$1 per hour. You can repair a lot of clocks in the space occupied by one motor car.

"The average charge for labor in the following different lines of trade is 87.2 cents per hour: Steam fitters, plumbers, gas fitters, sprinkler fitters, sheet metal workers, electricians, structural iron setters, ornamental iron setters, painters. You probably know from experience what they charge you for labor. Now, why should you sell your labor at less than cost?

"The Portland Automobile Trade Association adopted a rate several months ago of \$1 an hour for mechanics and 75 cents an hour for helpers.

"To give you a bird's-eye picture of what 10 cents an hour increase would mean to the members of this association, I figure that if each of our members employed ten mechanics, and if all labor was productive labor, it would mean \$300,000 per year. Supposing only two-thirds is productive, it would mean \$200,000."

#### SINGER IN FOR HIMSELF

New York, March 18—Special telegram—Charles A. Singer, former president of the Palmer & Singer Motor Car Co., is one of the chief incorporators of the Singer Motor Co. of this city, which will manufacture a new six. The car will have T-head 4 by 5½ motor which the makers state will develop 91.8 horsepower at 1,900 revolutions. It will be fitted with a C. R. G. carbureter and Westinghouse single-wire lighting and starting system. Four-speed gearset, V radiator, left drive and full equipment are features. The list will be below \$2,500. The company is incorporated at \$200,000 under the laws of New York. It will have a factory in Long Island City. A service station will be used as a factory until the building operations on Long Island City plant have been completed.

## Exports and Imports for January, 1914

### Also Comparisons With 1913

WASHINGTON, D. C., March 14—Details of the exports of motor cars during January and the 7 months ended January 31, 1914, with comparative figures, have been issued by the bureau of statistics. The totals were published in last week's issue of Motor Age. The detailed figures are as follows:

#### EXPORTS AND IMPORTS FOR JANUARY, 1914

	—1913—		January—1914—	
	No.	Value	No.	Value
Motor cars, and parts of—				
Motor cars—				
Commercial .....	87	\$ 182,271	45	\$ 74,491
Passenger .....	2,070	2,051,806	2,481	2,174,392
Total .....	2,157	\$2,234,077	2,526	\$2,248,883
Parts of (not including engines and tires) .....		433,936		475,299
Total motor cars, and parts of .....		\$2,668,013		\$2,724,182

	Seven Months Ending January—1913—		January—1914—	
	No.	Value	No.	Value
Motor cars, and parts of—				
Motor cars—				
Commercial .....	462	\$ 872,375	436	\$ 714,261
Passenger .....	11,555	11,350,156	13,553	12,540,593
Total .....	12,017	\$12,222,531	13,989	\$13,254,854
Parts of (not including engines and tires) .....		2,538,608		3,609,488
Total motor cars, and parts of .....		\$14,761,139		\$16,864,342

The exports, by countries, were as follows:

	—1913—		January—1914—	
	No.	Value	No.	Value
Motor cars—				
France .....	73	\$ 59,245	63	\$ 47,506
Germany .....	27	42,659	94	56,483
Italy .....	20	35,660	64	33,763
United Kingdom .....	374	258,463	1,030	855,973
Other Europe .....	53	61,937	175	121,245
Canada .....	468	593,700	370	423,093
Mexico .....	35	48,619	9	15,109
West Indies and Bermuda .....	68	68,104	58	50,651
South America .....	351	393,079	145	120,079
British Oceania .....	403	386,833	174	146,652
Asia and other Oceania .....	193	182,660	193	163,641
Other countries .....	92	103,118	151	214,668
Total .....	2,157	\$2,234,077	2,526	\$2,248,883

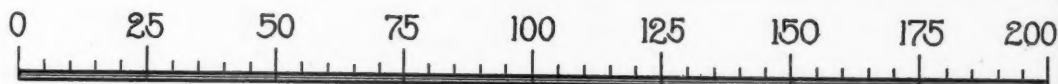
	Seven Months Ending January—1913—		January—1914—	
	No.	Value	No.	Value
Motor cars—				
France .....	377	\$ 289,188	464	\$ 361,803
Germany .....	247	231,035	482	333,544
Italy .....	168	150,253	195	137,710
United Kingdom .....	1,683	1,268,110	3,512	2,805,325
Other Europe .....	726	622,542	889	713,091
Canada .....	3,154	3,886,394	1,895	2,659,482
Mexico .....	193	339,305	124	207,457
West Indies and Bermuda .....	255	263,857	334	312,745
South America .....	1,661	1,842,500	1,348	1,412,340
British Oceania .....	1,869	1,714,328	2,142	1,846,576
Asia and other Oceania .....	1,133	1,068,437	1,269	1,251,814
Other countries .....	551	546,582	1,335	1,212,967
Total .....	12,017	\$12,222,531	13,989	\$13,254,854

The imports of cars were as follows:

	—1913—		January—1914—	
	No.	Value	No.	Value
Motor cars, and parts of—				
Motor cars, dutiable .....	71	\$174,689	12	\$ 40,754
Parts of (except tires), dutiable .....		37,688		42,192
Total motor cars, and parts of .....		\$212,377		\$ 82,946
Motor cars—				
France .....	24	57,649	7	24,213
Germany .....	21	54,735		
Italy .....	10	18,222	1	1,000
United Kingdom .....	8	25,401		15,541
Other countries .....	8	18,682		
Total .....	71	\$174,689	12	\$ 40,754

	Seven Months Ending January—1913—		January—1914—	
	No.	Value	No.	Value
Motor cars, and parts of—				
Motor cars, dutiable .....	536	\$1,247,226	221	\$508,784
Parts of (except tires), dutiable .....		167,169		355,784
Total motor cars, and parts of .....		\$1,414,395		\$864,568
Motor cars—				
France .....	277	659,424	99	248,763
Germany .....	54	138,509	15	37,307
Italy .....	79	128,780	39	58,666
United Kingdom .....	62	172,801	34	105,676
Other countries .....	64	147,712	34	58,372
Total .....	536	\$1,247,226	221	\$508,784

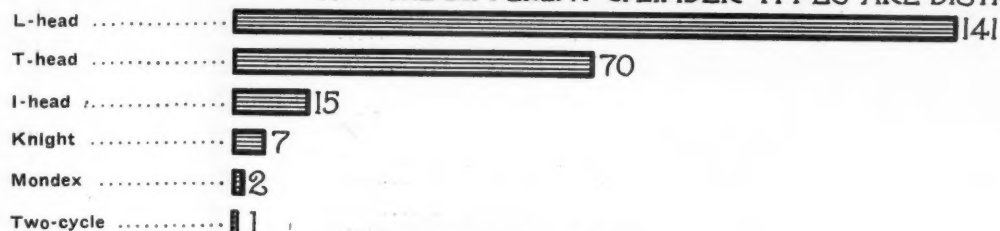
# Chart Showing Graphically Tendencies of American Cars



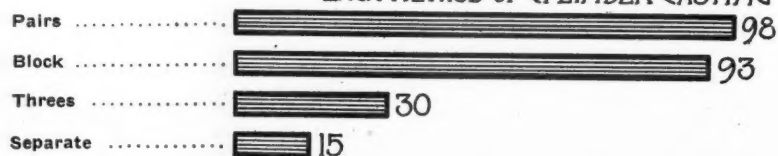
## POPULARITY OF FOURS AND SIXES COMPARED



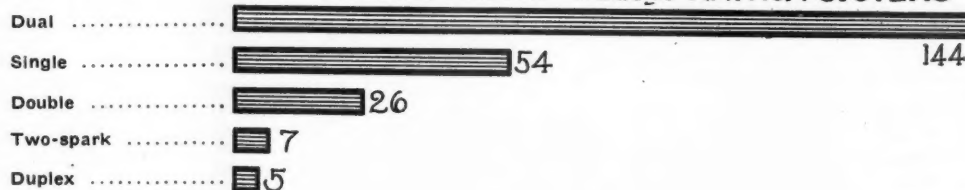
## HOW THE DIFFERENT CYLINDER TYPES ARE DISTRIBUTED



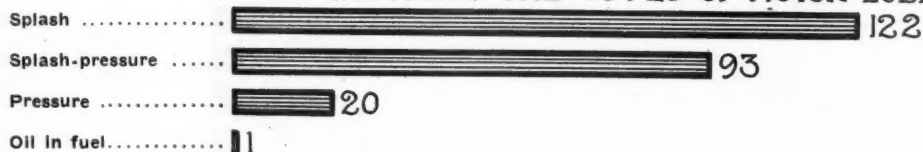
## NO. OF CHASSIS TO ADOPT EACH METHOD OF CYLINDER CASTING



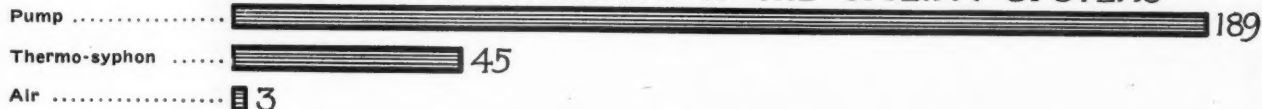
## DISTRIBUTION OF VARIOUS IGNITION SYSTEMS



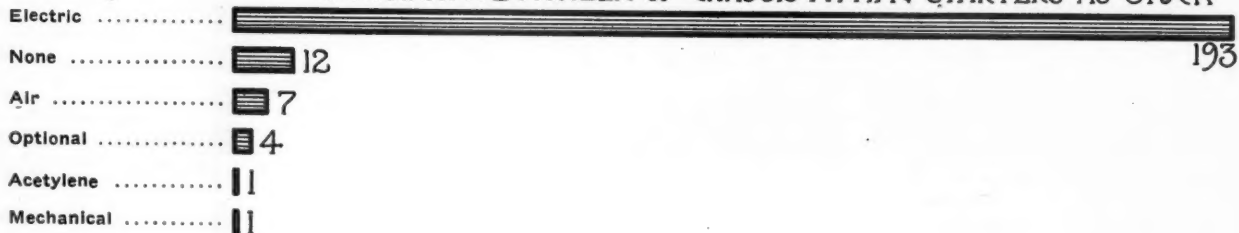
## GROUPING THE TYPES OF MOTOR LUBRICATION



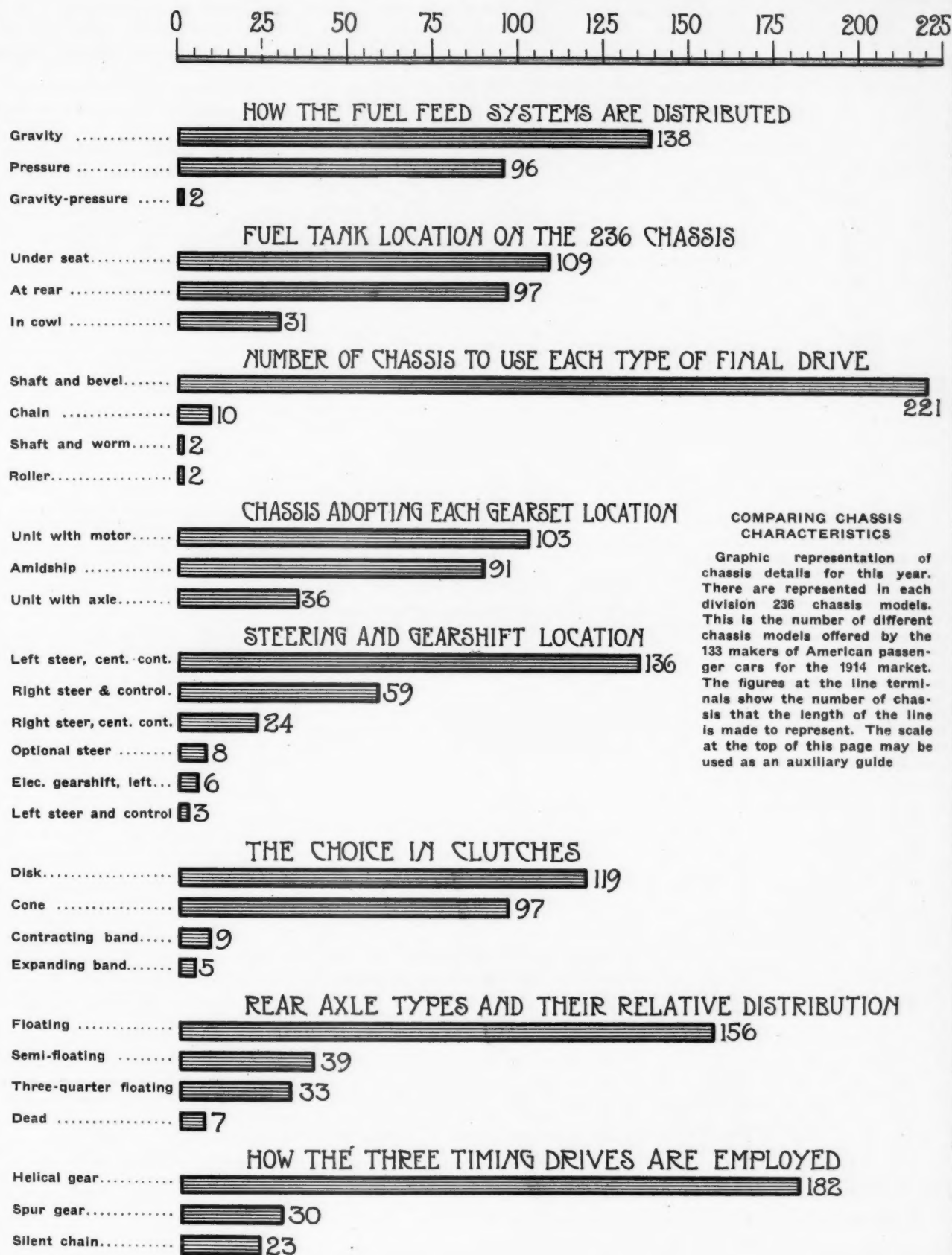
## RELATIVE POPULARITY OF THE COOLING SYSTEMS



## COMPARATIVE NUMBER OF CHASSIS FITTING STARTERS AS STOCK



# Offered to Motor Buyers for the Season of 1914





# Klaxon Injunction in Sparton Suit Made Permanent

## Other Late News Concerning the Industry

NEW YORK, March 17—Judge Hough has entered a final decree in the United States district court, in which he gives the Klaxon company a permanent injunction against the Jackson Eastern Distributor, Inc., the Garland Auto Co., and the Haynes Auto Co., dealers and users of Sparton horns. But he gives them the privilege of a secession of this injunction for 3 months by the payment of \$2,000 to the Klaxon company. This offer is open until March 25, and if these companies take advantage of this, they may go ahead unrestricted in their sale or use of the infringing Sparton horn until June 30.

This privilege was given the defendants on account of the pending appeal in Judge Chatfield's court in Brooklyn. The court saw that if the Newtowne people should win, an injustice would have been done to the Sparton people by enjoining them, so they were given a 90-day privilege by the payment of \$2,000 and the right to use the Sparton horn.

The injunction against the A. Elliott Ranney Co. still stands. On February 20, Judge Ward granted a preliminary injunction to the Klaxon against the Ranney company, preventing the delivery of Hudson cars fitted with Sparton hand-operated horns. Judge Hough now states that this injunction will stand until the Newtowne appeal is decided.

### LONG HORN AFTER KLAXON

New York, March 18—Special telegram—A patent infringement suit was filed today in Brooklyn by the Long horn interests against the Martin Evans Supply Co., Brooklyn agent for the hand Klaxon horn. It is claimed on behalf of the G. Piel company, maker of Long horn, that patents granted it are basic with respect to hand-operated horns. The Klaxon hand horn is claimed to be an infringement. Further, it is claimed that the Klaxon company obtained knowledge that application for patents on the Long horn were pending through interference preceding in United States patent office. The infringement is claimed to be deliberate and willful. It is claimed the Klaxon company allowed the Piel company to build up a substantial business in the Long horn without filing suit or making infringement claims under the Klaxon patent. After the Long horn success had been demonstrated Klaxon came out with a hand horn, it is claimed.

### FINLEY PORTER TO MAKE CARS

New York, March 17—Special telegram.—Finley R. Porter, who recently resigned as chief engineer and factory manager of the Mercer company, with which concern he has been associated for 4 years, announced today that he expects to have

a factory of his own with an annual capacity of approximately 4,000 cars. This will be divided between two models of 300-inch size which will list at approximately \$2,800 and of which 1,000 will be built, and a small car of 231 cubic inches capacity to sell at approximately \$1,500 and manufactured in quantities of 3,000 annually. Both of these will be four-cylinder types. For the present Porter has opened temporary offices at 1790 Broadway, New York city, until complete arrangements for a factory location and organization have been perfected.

### DELLING SUCCEEDS PORTER

New York, March 16—The Mercer Automobile Co., of Trenton, N. J., announces that E. H. Delling has been appointed chief engineer and designer, in place of Finley R. Porter, resigned. Mr. Delling is not a stranger in the Mercer ranks, having been connected with this concern about 2 years ago in the capacity of assistant engineer. Delling is well versed in European engineering practice, and he is the builder of the Deltal car, which was seen to good advantage in the 1913 Elgin road races.

### TO TEST WIRE WHEEL TIRE ECONOMY

New York, March 18—Special telegram—In order to secure positive evidence on the value of the wire wheel as a tire saver, the Pennsylvania Rubber Co. has secured two Lozier fours, one of which will be equipped with a full set of Vacuum cup tires and will be driven about the country, one behind the other until the tires blow out. Each car will lead on alternate days. It is estimated that the car weight will be 4,300 pounds. The tires used will be 37

## Obituary

GEORGE WESTINGHOUSE, whose name will live as long as vehicles of transportation exist, died of heart disease at his home in New York city on Thursday, March 12. The invention and ultimate marketing of the air brake for railroad trains was the first important invention of Mr. Westinghouse. This was patented in April, 1869, when he was 23 years old. Subsequent inventions brought fame and money to the inventor and to-day the factories bearing his name employ upward of 50,000 people. The motor car industry received a number of useful devices from Mr. Westinghouse, the most important of which is the air-shock absorber, which is now being marketed in every important city in this country. He was a member of many engineering societies in this country and abroad and was active as a member of the Society of Automobile Engineers.

by 5 quick demountables and the wire wheels will be of the rudge type as supplied by the Standard Roller Bearing Co. The test is run under the auspices of the Automobile Club of America, the entire expense being charged to the company.

### GARFORD TAKES OVER DEAN PLANT

Elyria, O., March 14—The Garford Mfg. Co., of Elyria, Ohio, has been incorporated with a capital of \$1,300,000 to take over and operate the plant of the Dean Electric Co., which has been in the hands of receivers for some time. Of the authorized capital, \$500,000 is in 7 per cent preferred stock and the remainder in common stock. Stock was issued to take up the outstanding securities of the Dean Electric Co.

The concern will continue to make all kinds of electrical apparatus, including motor car supplies. The officers of the new company are: A. L. Garford, president; A. G. Bean, vice-president; A. L. Patrick, treasurer and John Watson, secretary.

The secured creditors of the former company received notes of the new company equal to the face value of their claims while the unsecured creditors received notes to the value of 75 per cent of their claims.

### DODGES ATTACK INCOME TAX

Washington, D. C., March 17—Special telegram—Suits attacking the constitutionality of certain provisions of the income tax law were filed in the district supreme court here today by John F. and Horace E. Dodge, of Detroit, motor car manufacturers. They contend that the law unduly discriminates against individuals and partnerships in favor of corporations in the laying of surtaxes and in permitting corporations to withhold from taxation such portions of their income as may be necessary for the needs and purposes of their business. The latter privilege is not allowed to individuals, their bill says.

It generally is understood here that this case is a test suit in which all the motor industry is concerned.

### CROWN BUYS NEW ALBANY PLANT

Louisville, Ky., March 14—The Crown Motor Car Co., which several months ago, contemplated moving to Hamilton, O., has changed its plans, and this afternoon purchased from Ferdinand Kahler the big motor car factory on Vincennes street, New Albany, Ind., formerly occupied by the Ohio Falls Motor Car Co. The price paid was \$50,000 it was announced. A representative of the company stated today that the concern would employ 600 men and 10,000 machines would be manufactured between now and September 1.

# The Motor Car Repair Shop

USUALLY the cracking of a water-jacket, while the car is on the road, means the vehicle becomes inoperative and must be towed to the nearest garage to have the cylinder welded. Not long ago a road scout found one of the cylinders of the motor cracked and continued, after making a simple repair, for more than 100 miles. The car was a Thomas with separately cast cylinders, but the repair could be used for pair-cast or even block motors.

In this particular case the crack was about 2 inches long and water was pouring out of it in great quantities. The driver first emptied the remaining water into a pail. The water manifold connection to the cracked cylinder was then removed and a metal gasket placed over the cylinder hole, as in Fig. 2, thus preventing any water from entering the jacket. The spark plug was removed and the valve tappet adjustments also, so as to keep the valves closed continually. The water was poured back into the radiator and the car continued for more than 100 miles with one cylinder with an empty waterjacket doing no work.

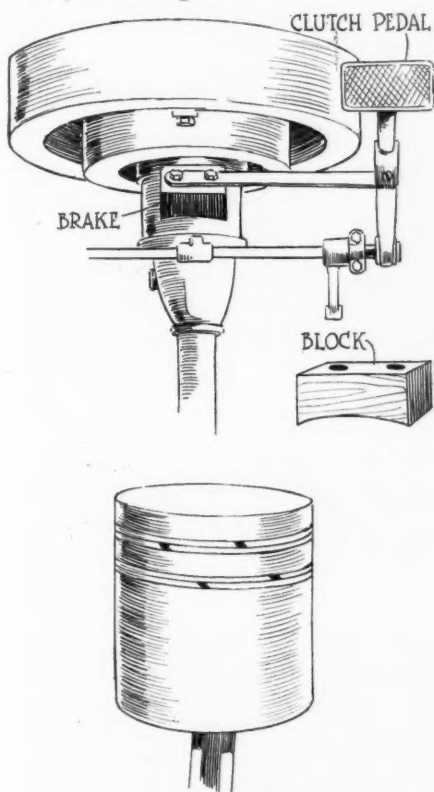


Fig. 1—The upper illustration is a simple form of clutch brake which consists of a rod with a wooden block attached operated by the clutch pedal. When the clutch is released the brake is applied. The lower illustration shows the use of two narrow piston rings in one slot instead of one large ring in order to prevent oil and gas leakage. This appears to have some merits

## Some Helpful Road Repairs

This method would hardly be advisable in a block cast motor, as a crack in the jacket means the water supply to all cylinders must be cut off. Should the distance to be traveled be short the draining of the jackets might do, but the hood should be removed and the motor stopped occasionally to cool. In a motor with the cylinders cast in pairs, it is obvious that two cylinders must be cut out, and it would be cheaper to run to a garage 5 miles away with only two cylinders operating than be towed that distance at considerable expense.

### A Leakproof Piston Ring

The writer was informed by a repairman that the use of two narrow rings in each slot as shown in Fig. 1, shows slightly better results than if one wide ring is used. The leakproof principle is used in this method and it appears to be worth a trial. There would be better service obtained if some sort of spacer were placed between the two rings so that wear would not be so rapid. Where the piston rings are now rather narrow it hardly would pay to use the method described herewith, but where the rings are very wide the system apparently would be helpful. However, it is not advised to adopt this method before it is given a trial.

### A Simple Clutch Brake

In some types of vehicles which do not employ clutch brakes and which give trouble by the clutch spinning and raking the gears, a simple brake such as shown in the illustration may be fitted by the average mechanic. The clutch pedal usually operating a bell crank the latter can be fitted with a lever clutch as shown in Fig. 1. When the pedal is depressed and the clutch disengaged the block of wood will rub against the clutch and hinder it from spinning. The block of wood, of course, should rub against a smooth surface and if the clutch has no such surface a drum must be fitted. The fitting of such a device is a simple matter for a good mechanic.

### A Spring Repair

One thousand miles from a service station and a front spring broken is an unusual occurrence, but it happened recently to a tourist's car and after waiting 10 days for a new spring it was found the wrong size was shipped. The new spring was a few inches shorter than that required and when placed in position appeared as shown in Fig. 2 at A. The driver of the car continued after making the fol-

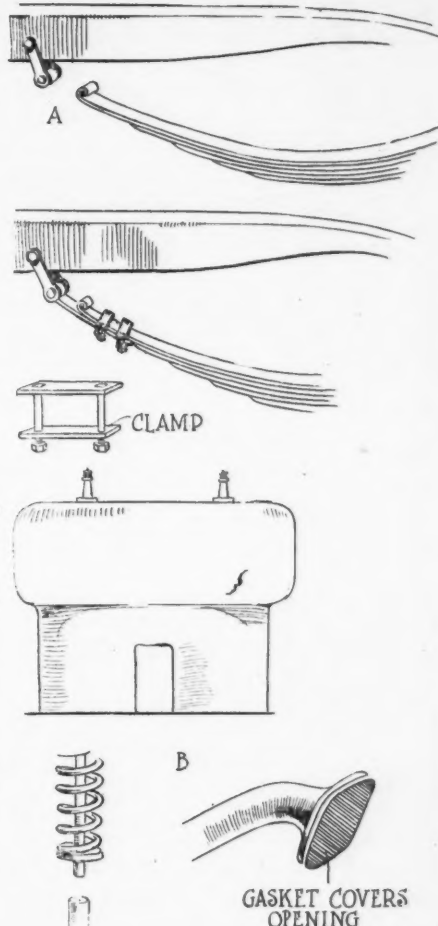


Fig. 2—At A is shown how a repair was made when a spring shipped to a man on the road was too small. The main leaf of an old spring was broken off and butted against the short one as shown and then clamped. The lower illustrations show the method employed in operating a motor with a cracked water-jacket. The water manifold leading to the cracked cylinder is obstructed with a full gasket punched to receive the cylinder studs. The valves of the cylinder are made inoperative

lowing repair: He took the main leaf from the old spring and cut a piece which was long enough to butt against the short spring. The illustration shows this clearly. Two clamps such as shown in the detail were then placed around the spring at the union and the car continued for 2,500 miles and only occasionally did the clamp nuts require tightening. Those who contemplate much touring should carry with them a number of such clamps which any mechanic can make in a short time. The plates should be as wide as the spring leaves and about  $\frac{3}{8}$  inch thick and the bolts about 4 inches long. A spring repairer and a hub drum for getting the car out of a mud hole are invaluable touring accessories.





Fig. 1—Testing float chambers. It is very important that the float and float chamber be tested under working conditions. In the Zenith plant each spun-brass float is first plunged into a bucket of hot water to test for leaks. The moment the float is immersed, the hot water heats it and expands the air within, and if there is a leak, bubbles are thus forced out under considerable pressure. Next the floats are assembled in the float chambers, and then placed on the testing rack as shown above. A gasoline gauge glass is then temporarily attached to each instrument, which indicates the level in the float chamber of the gasoline which is now admitted. The float should occupy a certain position with respect to this level, and the performance of each carburetor is carefully noted and corrected in this way. The gasoline is carried in a tank which is about 6 feet above the testing bench.

## Some High Spots in Carburetor Manufacture

THE manufacture of the carburetor is a highly specialized art. It has developed along with the rest of the industry and special factories making only this one part have grown up. Within them is found machinery for quick and accurate manufacture which is on a par with that of any other manufacturing plant.

In the new Zenith factory, in Detroit, for instance,

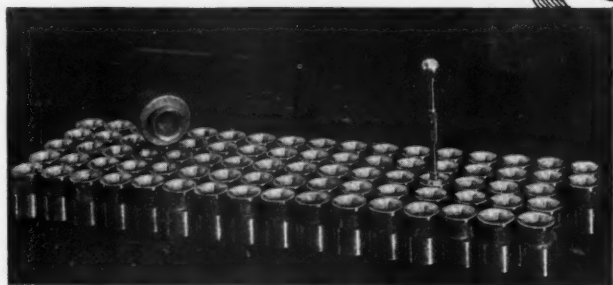


Fig. 2—The air nozzle inspection. The air nozzle in the venturi tube of the carburetor must be accurate. The ball gauge method of determining this accuracy is employed. A long row of nozzles is placed on the bench and it is a simple matter to see if they are all of correct size. One end of the ball gauge must slip through the nozzle, while the "no go" end must not. This end is down in one of the pieces in the illustration. The "go" end measures .7851 inch, while the "no go" end is .7898 inch. Thus there can be a variation of plus or minus about two thousandths. At the left is seen the ring gauge which must readily slip over the outside of the nozzle without any play.

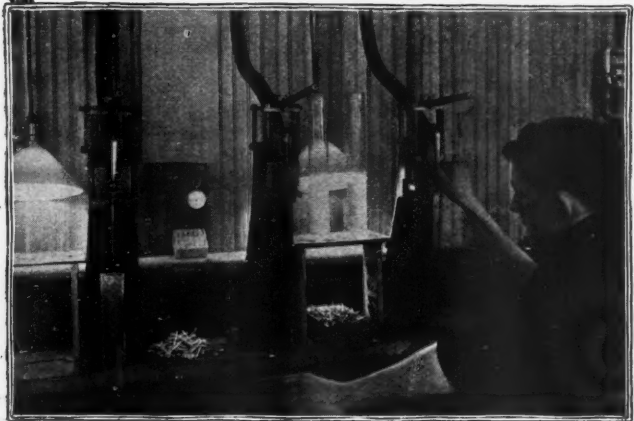
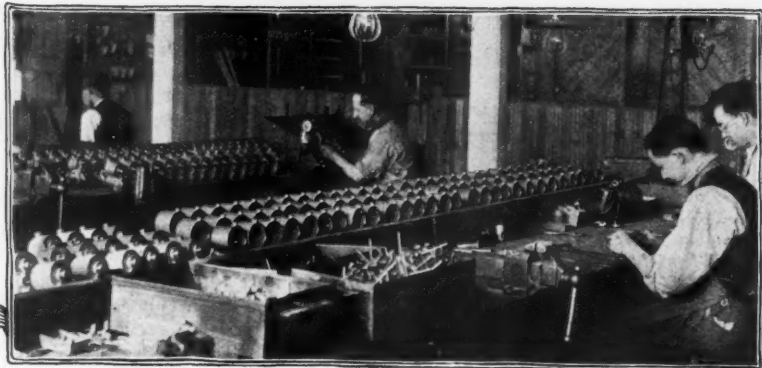


Fig. 4—Nowhere else in the motor car does the variation of the diameter of a small hole mean so much as in the carburetor. The illustration shows the means devised by Zenith for accurately testing the diameter of the hole drilled in the spraying nozzle. Although these holes are drilled on jewelers' lathes with greatest care, yet they sometimes vary slightly and there is but one infallible method of determining whether or not this variation is within the permissible limits. This is by means of a flow of water through the nozzle under a given pressure and in a given time. This is testing the nozzle under actual running conditions, and in a certain time as measured by a stop watch, a given size nozzle under a given pressure will give a certain level of water in a graduated measuring tube. The permitted variation in water level is very slight.



Fig. 3—Drilling the main jets at the rate of 1,200 a day, or two per minute. These jets come to the lathe man from the automatic machine which finishes the outside, but the inside must next be drilled. A small chuck grips the piece quickly, and the drilling is simply a matter of pressing the chuck and nozzle against the drill. To save the operator's time in disposing of the pieces which he has drilled, the chute is provided which directs them into a tray below. Thus several seconds are saved on each piece, for the man has only to drop the piece from his hand into the mouth of the chute directly below the lathe head.

Fig. 5—Several hundred Zeniths in the making. A view in the assembly department showing a line-up of partially finished carburetors ready for the fitting of floats and so on. Each assembler has a vise to hold the instruments in the making and the parts ready for fitting are contained in steel trays before him.





where 200 carbureters a day are made, the visitor sees many special machine tools, unique methods of quick manufacture and commendable operative efficiency. Here, as in other well-managed plants, accuracy must not and is not sacrificed at the altar of quantity. Each carbureter must undergo exceedingly rigid inspection throughout its several stages of growth from the raw materials; each nozzle must be as accurate as watchmakers' tools and exhaustive tests can make it; each hole drilled in body or mixing chamber must be correct; the float must perform its duty with the minimum of variation.

Some of the very interesting factors entering into this specialized manufacturing at the new plant have been caught by the camera and are shown herewith. They give some hint of how quantity and accuracy are interlinked.



Fig. 6—Multiple-spindle drill used for drilling all of the holes in the barrel or air passage of the carbureter. The part is placed in the jig which then accurately locates the drill points for all twelve holes to be drilled. There are almost as many sizes of drills as there are holes, and they are so arranged that the drilling of all holes with one side of the jig in position can be done at one operation, the other drills not interfering. It takes 2 minutes 20 seconds to complete all twelve

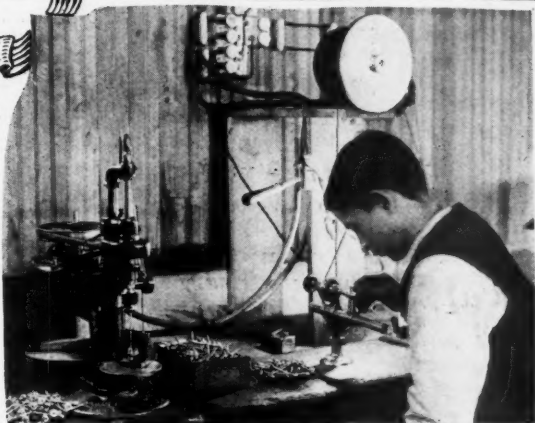


Fig. 7—In the fine work necessary in the drilling of holes through the spraying nozzles, great care must be taken to have them absolutely accurate and uniform in size. Zenith uses two jeweler's lathes for this purpose, the one on the right serving to center the nozzle, while the small drill placed on the left is used to complete the operation. Many accurate operations similar to this will give the reader a better idea of the amount of skilled workmanship and care put into the construction of this important component of the motor car

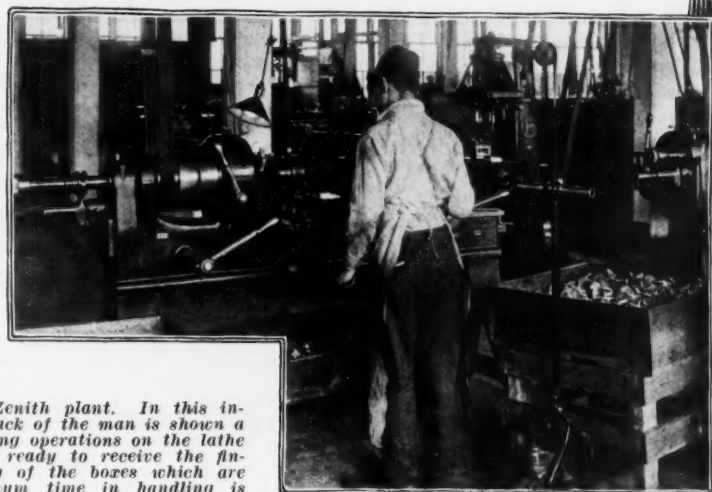


Fig. 8—A study in efficiency at the Zenith plant. In this instance, motion study comes into its own. Back of the man is shown a box full of pieces ready for certain machining operations on the lathe in the center. At his left is another box ready to receive the finished pieces. The truck can pick up any of the boxes which are standard in the factory. Thus the minimum time in handling is effected

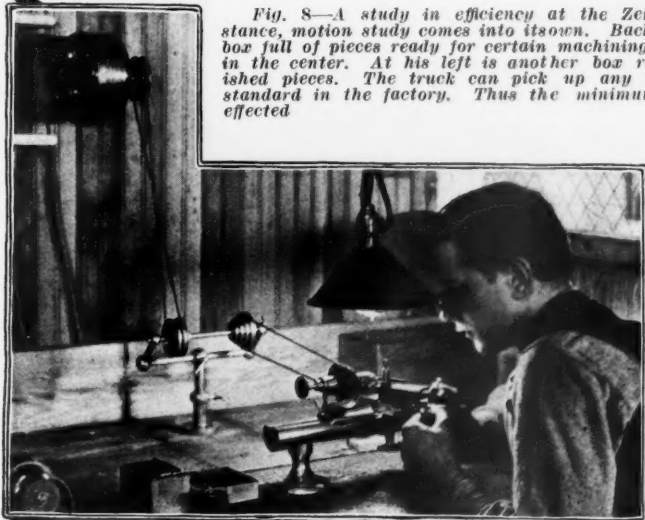


Fig. 9—Delicate lathes in a carbureter factory. Gasoline being extremely volatile can only be controlled by microscopic accuracy in the needle valves and the size of the hole in the spraying nozzle. This fine drilling must be accomplished on special jeweler's lathes where the small parts can be turned and tooled to as close an accuracy as human ingenuity can devise. The above illustration shows part of the equipment installed by Zenith for the careful machining of needle valves which control the flow of gasoline from the float chamber

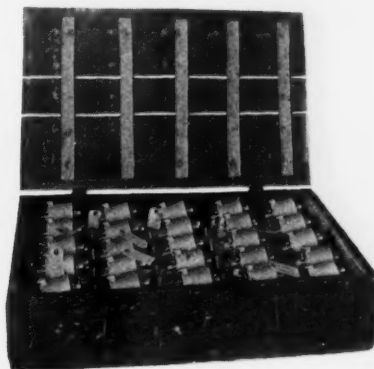
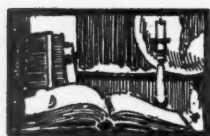


Fig. 10—Shipping box for local delivery of Zenith carbureters. This box has compartments for about twenty-five carbureters, depending on the size. The cover has rubber strips on its inner side which press against the instruments and hold them in place when hooked down. This makes a very easy and quick method of carrying a large number of carbureters at a time and saves a lot of handling



# The Readers' Clearing House



## SUGGESTS A NEW MOTOR CAR TAX

Owners Should Pay According to Horse-power Per Hundredweight

**S**AN FRANCISCO—Editor of Motor Age—The right of the state to tax motor car owners seems to be established, but the form of the tax is in most cases very crude and clumsy. The results are inaccurate and unjust to many persons, on account of the arbitrary classification for the purpose of determining the differential tax.

The justification of a state motor tax is properly held to be the fact that the industry has necessitated greater expenditure by the state for improved roads. And the justification for the graduated tax is that the large cars cause more wear on the road surface than the smaller cars. But the wear is a function of both weight and speed. A light car running at high speed may cause more injury to the surface than a heavy car at slow speed. The relative values of the two factors has probably not been, and may never be determined actually, but they should be recognized in the making of a graduated motor car tax. This can be done, simply and satisfactorily, by such a tax as the following: An annual tax shall be paid for each motor car, motorcycle, or power vehicle amounting to 2 cents per horsepower-hundredweight. A minimum tax of \$5 will be collected. No tax shall exceed \$50. The limits can, of course, be varied.

Such a tax would eliminate all arbitrary classification, and the sudden and unjustifiable difference in the taxes as now paid. It would increase rapidly with increased size and horsepower, which is correct, and would encourage the use of small low-powered cars. I give below a table showing how the amount of such a tax would vary for different weights and horsepower. Curves plotted from these values are shown in Fig. 3.

	Weight in pounds				
H.P.	1,000	2,000	3,000	4,000	5,000
10	\$5.00	\$ 5.00	\$ 6.00	\$ 8.00	\$10.00
20	5.00	8.00	12.00	16.00	20.00
30	...	12.00	18.00	24.00	30.00
40	...	...	24.00	32.00	40.00
50	...	...	...	...	50.00

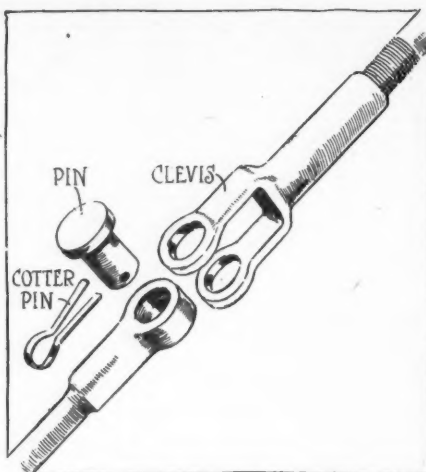
I should be interested to hear any criticism of this rate.—J. T. Whittlesey.

## HOW TO TIME THE MOTOR VALVES

Car Will not Fire Properly Under 20 Miles Per Hour—Formula Given

Memphis, Tenn.—Editor Motor Age—How would one time a Warren 30, 1911 model? I bought the car disassembled and as there seems to be no marks I am unable to time it.

2—What suggestions has Motor Age as to holding the bolts in on the universal joint between the clutch and transmission in a 1910 Speedwell? I have tried lock washers, wire, etc., but they work loose.



## ADJUSTING THE BRAKE RODS

There are many minor adjustments which any owner may make and which often are left to the garageman and the time charged up accordingly. There is no reason why the brakes should not be attended to by the owner himself since the work requires little time and less mechanical knowledge. The average car is fitted with brake rods which are adjusted by a clevis arrangement such as shown in the illustration above. The clevis pin is locked with a cotter pin. This pin should be removed and the clevis pin taken out, thus separating the two parts of the rod. The clevis may be turned backward or forward. To make the brakes hold better the rod is shortened by turning up the clevis a few threads. The important point to remember is that both rods should be taken up equally. That is, if the clevis is moved four threads on the right side the other clevis should be moved the same distance. When the adjustment has been made the car should be run rapidly on a dry pavement and the brakes applied harshly. One person should watch the rear wheels to see that they both slide at the same time. If they do not the wheel which turned should have the rod shortened a little more. Cars which employ equalizers are more easily adjusted and usually employ a turnbuckle.

3—This car will not hit properly under 20 miles an hour. The compression seems to be alright in all cylinders.—J. C. Rogers.

1—The Warren instruction book gives no information on either valve or magneto timing. The magneto may be timed by following the instruction given in the repairshop department of Motor Age issue of March 12. A good valve timing formula is as follows: The intake valve should open about 15 degrees crank angle past top dead center and close 20 degrees after lower dead center. The exhaust valve should open about 40 degrees before bottom dead center and close about 5 degrees after top dead center. For further information about the Warren write the Puritan Machine Co., Detroit, Mich., which handles the repair parts.

2—Use a castellated nut and drill the bolt to take a cotter pin.

3—The trouble may be due to a weak

spark caused by weak magneto magnets, by a loss of current in the ignition system through the agency of loose wires, the spark plug gaps may be too wide, the plugs may be leaky. The carburetor may be adjusted for high speed work and not for ordinary running. You do not state what make of carburetor you are using so the proper adjustments cannot be given. There may be a number of air leaks around the cylinder plugs and the manifolds. If the misfiring is irregular, ignition hardly is the cause.

## SPEEDOMETER CHART EXPLAINED

Jones' Device Plots a Curve for the Truck's Doings of the Day

Hibbing, Minn.—Editor Motor Age—Explain the method of reading the chart used on the Jones recording speedometer—Lee Durkee.

A representative chart taken from a Jones' recording speedometer is shown in Fig. 1. The chart was put on at 8.15 as shown by AA. The truck to which the motor was attached started at 9.45 which is marked as A in the illustration and continued running as shown by the curve until 10.37 which is shown as B. The truck did not run from 10.37 to 10.44, but began again at 10.45 and continued until 11.00 which is shown as C. Thus, the zig-zag markings represent truck operation while the straight lines show that the car was not running. The chart shows then that the truck operated on and off until 5.45 and then remained stopped for 16½ hours or until 10.15. The zig-zag markings from 10.15 to 11.08 shows truck operation for that period and at 2 o'clock the line ends at D which shows that at that time the chart was removed. The total time the truck was on the road is known as well as the running time and since the instrument incorporates a speedometer the speed of the vehicle during the day is easily ascertainable. The speed during each run is found easily.

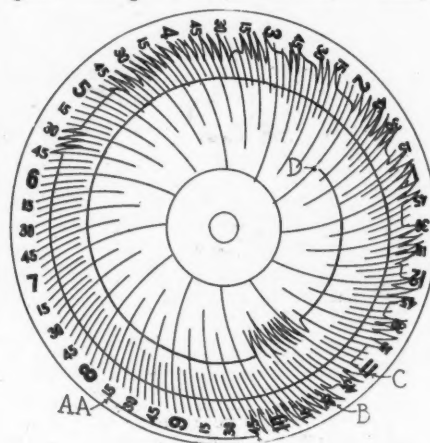


FIG. 1—CHART OF RECORDING METER

Showing the starts and stops, the distance traveled and the mileage per hour. Each cross stroke represents ½ mile of car travel



Each cross stroke represents a run of  $\frac{1}{2}$  mile forward or backward, therefore if there are 12 cross strokes between 11 and 12 o'clock the car traveled at the rate of 12 miles per hour.

#### Reader Offers Correction

Goshen, New York—Editor Motor Age—Believing that you always try to be accurate when answering queries in The Readers' Clearing House, I submit the following correction regarding weights and gasoline consumption of the National car published in the February 26 issue of Motor Age.

I own, and have driven, a National 40, series V-3, toy tonneau 9,000 miles. The weight of this car, fully equipped, gasoline tank full, two complete 37 by 5-inch tires on rear, is exactly 4,210 pounds. I get over 11 miles to the gallon. I consider this very good and am one of the few who realize weight in a car means easy riding and safety.—W. H. Davis.

#### A. D. CARPENTER DEFENDS CUTOUT Agrees That the Device Should Be Fitted —How He Uses It

Sauk Center, Minn.—Editor Motor Age—I was pleased very much, indeed, with Paul Thonney's, Jr., article in Motor Age February 26 issue, on exhaust cutouts, and most heartily agree with his protest against manufacturers leaving them off of their cars for 1914. I could not think for one moment of using my roadster without a cutout. When I'm alone it is the very best of company for me and never tires of singing its merry tune, which tells me of the perfection of my motor's firing.

Its logical use is easier adjustment of



FIG. 2—SIGNAL SYSTEM FOR MOTOR ROADS

Reader suggests an electrically-operated caution arm which should be placed some distance from the crossing and which will show danger when a train is 200 yards away

motor firing, perfect cleaning of cylinders, quick release of burned gases, thereby preventing over-heating of motor. Its use keeps the muffler from clogging, thereby increasing power at no cost. It prevents back-pressure to a considerable extent. It is a good road signal, quietly asking a favor of the team ahead without abruptly blowing a horn or squealing with a whistle or other device which causes more or less hard feelings by the party in front.—A. D. Carpenter.

#### RAILROAD SIGNAL FOR MOTOR ROAD Reader Also Suggests Crossing Bells Are Not Effective

Chicago—Editor Motor Age—There was recently announced a road signal system for motorists' use which employed a revolving lamp, and since this was suggested I thought of the railroad signal system and see no reason why it cannot be applied to road work. I submit the drawing shown in Fig. 2 which depicts a bad turn and a train about 200 yards from the unattended

crossing. Could there not be an arrangement whereby a signal is set when the train reaches the 300-yard mark? I see no reason why it cannot be done, and think it would prevent many accidents. Continuing on the safety-first subject, I cannot understand why bells will ring at the railroad crossings. Why don't the railroad companies place the bells on the road 100 or 200 yards from the crossing and then a motor car coming at high speed, unaware of the crossing, will not crash into the gates and perhaps into the train. By an electrical arrangement the signal system I suggested would cost a little

more, but I think it would save its cost the first month in use. The present practice of crossing bells ringing at the crossing appears inadequate, as a driver does not know a train is coming until he gets within a few yards of the crossing.—Charles Brown.

#### OBJECTS TO THE EXHAUST CUTOUT Disagrees with Paul Thonney Who Defended the Accessory

Jacksonville, Texas—Editor Motor Age—Paul Thonney, Jr.'s article in the February 26 issue of Motor Age is a very good argument in favor of the cutout, but I think it would be good for us to look at the effect the cutout had on the motorcycle business 5 years ago. In my opinion there would be at least 25 per cent more motorcycles in the United States if the cutout had never been put on them. Even now there are many parents who would not let their sons ride such "dangerous noisy gatling guns." This is very injurious to sales. Likewise with the motor car, it hurts sales. Very often I hear expressions similar to this made by prospects: "Doesn't Mr. Dublin's Hudson run smoothly. It simply glides along although it has been used almost 2 years. That's the kind of a car I'm going to buy." And then again, "Say, didn't Mr. Smith get stuck when he sunk \$2,300 in

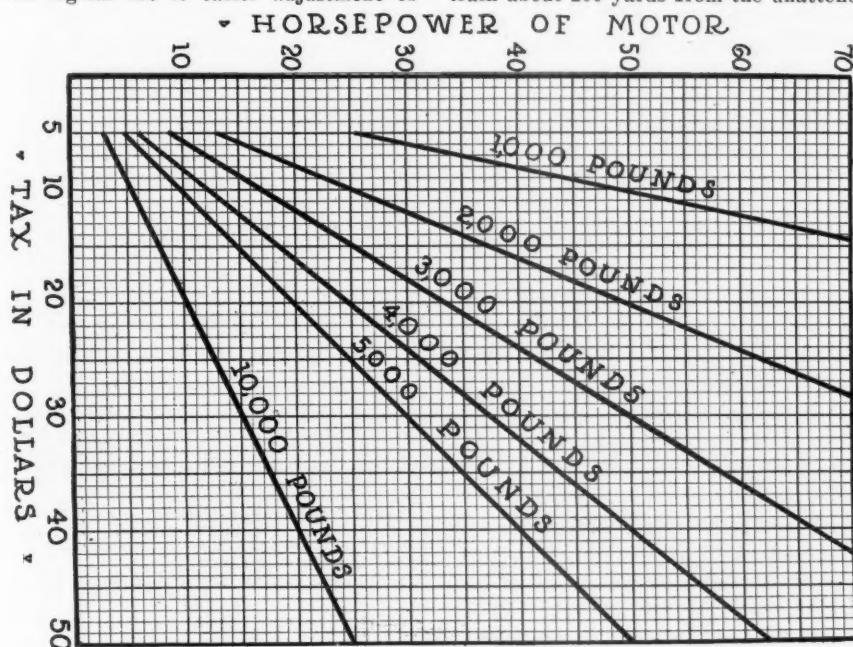


FIG. 3—CURVES SHOWING SUGGESTED HORSEPOWER TAX

The weight and horsepower are considered. Thus, a car of 35 horsepower and weighing 2,000 pounds should be taxed \$14

#### Questions Answered and Communications Received

J. T. Whittlesey.....San Francisco  
J. C. Rogers.....Memphis, Tenn.  
A. D. Carpenter.....Sauk Center, Ia.  
Lee Durkee.....Hibbing, Minn.  
W. H. Davis.....Goshen, N. Y.  
G. W. Klesow.....Jacksonville, Tex.  
Charles Brown.....Chicago  
R. L. Martin.....Fort Worth, Tex.  
E. D. Shafer.....McConnellsville, O.  
A. A. Major.....Eureka, Ill.  
R. B. D.....College Station, Tex.  
G. Sharp.....Beemer, Neb.  
R. H. L.....King City, Mo.  
J. E. Palmer.....Grand Haven, Mich.  
L. V. Denman.....Hudson, Wyo.  
W. A. Gallion.....Elkhart, Ind.  
Hind.....Detroit, Mich.

No communication not signed with the reader's full name and address will be answered.

that tub! That is the noisest car I ever heard. You couldn't give me a car like that." Such remarks boost the cutoutless car as the majority of prospects demand a quiet running motor in preference to the continuous pop-pop-pop-pop of the cutout which only too often is never closed when passing animals in the road, women, schools or churches during religious services.

The cutout has been discontinued, not alone, by the regulations against it but also on account of the grand-stand stunts of show-off drivers' reckless abuse of it which prompted city councils' actions. Personally, I like to hear my cutout but for the sake of my neighbors, friends and the public in general, I don't like to see them put their hands to their ears while I pass and then make remarks regarding my noisy rattle-trap car and my not having any better mechanical sense than to pay such a big price for a bunch of junk.

The cutout is of some advantage in adjusting a car, but any experienced mechanic can do just as good a job with but very little more time as there is no muffler made that will entirely obliterate the purring sound of the motor. I have had 6 years' experience in motorcycle and motor car establishments and during that time I have observed the cutout's effect on the public. It isn't worth the price of public opinion you have to pay for it.

As I stated before, I like the cutout but I am giving it up for something 100 per cent better—silence. A silent running car is the best advertisement for any shop or salesroom. Let us hear from others.—G. W. Kiesow, Jacksonville Motor Co.

#### OPERATION OF CAMERON GEARSET

**Affords Direct Drive on all Speeds—Incorporated in Rear Axle**

Fort Worth, Texas—Editor Motor Age—Kindly explain the Cameron gearset.—R. L. Martin.

The gearset used on Cameron cars is incorporated in the rear axle and affords direct drive on all speeds. The set is shown in Fig. 4.

To shift gears, it only is necessary to press a foot pedal which disengages the

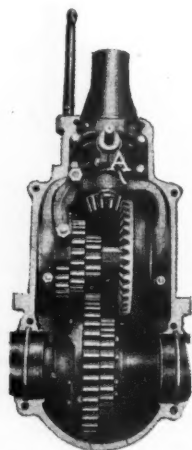


Fig. 4—Cameron gearset which is incorporated in the rear axle and which has direct drive on all speeds

clutch and unlocks the gear. After depressing the pedal, the lever can be pulled back into a neutral position and moved sideways opposite whatever gear or slot is wanted, and thrown forward again. As soon as the lever is forward in position, the foot pedal is released, locking the gear into mesh and releasing the clutch. The action in the rear axle in shifting is as follows. When the lever is pulled back, the arch A, containing the bevel gears and the three cross-shaft gears is moved forward in the case, pulling the gears out of mesh. The side movement of the lever moves the three spur gears sideways until whatever gear requires is brought in line with the gear on the rear axle. The forward movement of the lever throws the gears into mesh, and the locking device which is attached to the foot pedals locks them.

#### DROPS OUT OF SECOND SPEED Many Reasons Given for Gearshift Lever Acting Queerly

McConnelville, O.—Editor Motor Age—The intermediate plunger on my Studebaker 25 jumps out of its notch on the shifter shaft, and, although I have had a new shaft put in and a thick washer under the plunger spring, it has not entirely removed the trouble but has overcome the difficulty somewhat. How can this be remedied entirely?

2—What is the diameter of the rear axle of the 1913 Studebaker 25?

3—What does Motor Age know about the merits of peroxide of hydrogen as a carbon-removing agent?—E. D. Shafer.

1—The trouble may be due to an improperly cut shaft. When you installed the new shaft the grooves may have been cut wrong and when you shift into intermediate the plunger just rides on the shaft as shown at A in Fig. 6, when it should seat as shown at B, in the same illustration. The gear teeth may be battered so that the two intermediate gears will not hold but instead have a tendency to disengage the moment they are made to strike one another and thus push the lever out of second. The shifter lever may be prevented from going into its gate all the way. Look carefully over all connections and see that nothing prevents the lever from moving freely from neutral to the end of all the divisions in the H plate. Something may be binding in the cross shaft.

2—The axle shafts are  $1\frac{1}{8}$  inch in diameter.

3—Motor Age knows of no successful experiments where peroxide of hydrogen was used as a carbon remover. The use of this liquid in solution with kerosene, as a fuel has been found to show good results. George B. Selden is responsible for the information that the two liquids form a good fuel for motor cars.

#### Gear Shifter Lever Trouble

Eureka, Ill.—Editor Motor Age—I have an E-M-F 30 and the shifter lever slips out of high speed and will stick too tightly in the other speed positions. I have bent the springs below the H slot, but it only helped a little. I also have cut deeper notches in the shifter lever.—A. A. Major.

A plausible reason for the lever sticking tightly in low and intermediate is that

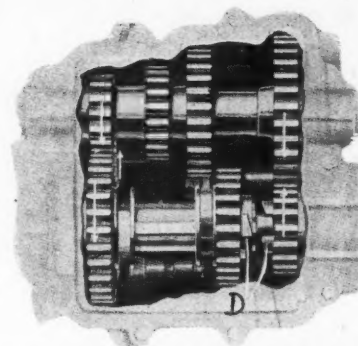


FIG. 5—WHY LEVER SLIPS OUT OF HIGH  
One cause may be due to the dogs D being worn excessively

the notches are cut too much that the plunger on the shifter rod seats too deeply. This would cause easy engagement and hard disengagement. The sticking may also be due to the secondary shaft being out of alignment. If the bearings upon which this shaft operates are worn considerably the shaft alignment should be given some consideration. That the lever slips out of high speed may be caused by the dogs D in Fig. 5 being worn excessively. You will get some information on this subject by reading the answer to E. D. Shafer printed on this page.

#### ETHER INJURIOUS TO THE MOTOR Found to Cause Rapid Wear of the Metal—Paint Makers

College Station, Tex.—Editor Motor Age—I would like further information on the use of ether with gasoline than that given in the January 8 issue of Motor Age. In what way is the mixture harmful to the engine?

2—Is there any danger of injuring the motor by the force of the explosion?

3—Does the ether mix freely with the gasoline when placed in a tank?

4—Kindly tell me what kind of paint to use in order to secure a good smooth paint on a hood.—R. B. D.

1—According to a chemist in Chicago who experimented with ether in the fuel, "the substance chews up the motor," or in other words causes rapid wear.

2—Not if the proportions of ether to fuel are kept low.

3—Yes.

4—The following concerns produce suitable paints for hoods and other metal parts: Valentine & Co., New York; Berry Bros., Detroit, Mich.; Northwestern Chemical Co., Marietta, O.; Hanline Bros., Baltimore, Md.

#### BACK PRESSURE ON POWER STROKE At High Speeds Gases Do Not Leave Cylinder Fast Enough

Beemer, Neb.—Editor Motor Age—1—What should be the length for the connecting rod of a motor car engine in proportion to its stroke?

2—For maximum power and efficiency, give the proper valve timing for a motor car engine.

3—As I understand it there is back pressure at the end of the power stroke. Kindly explain this. What is the nature of this back pressure and what causes it?

4—Is there any advantage in offset cylinders?—G. Sharp.

1—It is good practice to make the connecting rod length from 2 to  $2\frac{1}{2}$  times the stroke length.

2—A good valve timing formula is as



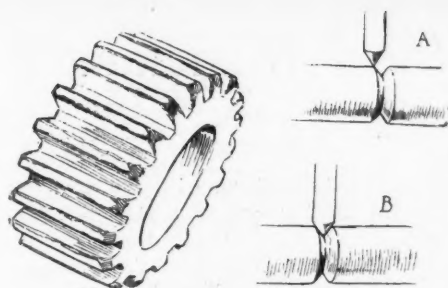


FIG. 6—CAUSES OF SHIFTER LEVER SLIPPAGE

A new rod was made and the grooves may have been wrong as shown at the right. The gear teeth may be battered

follows: Open the intake valve about 15 degrees beyond top dead center, open the exhaust 40 degrees before bottom dead center, close the intake 20 degrees beyond bottom dead center and close the exhaust 5 degrees beyond top dead center.

3—Modern four-cycle engines show little back pressure upon the piston at the end of the power stroke except at high speeds. The exhaust valve opens gradually and before the end of the power stroke. The explosion occurs, and the piston starts to go downward and before it has reached the end of its stroke, say it has traveled only  $\frac{7}{8}$  of its stroke, the exhaust valve begins to open. If it did not there would be excessive pressure on the piston as it started to go upward on the exhaust stroke and the pressure would be almost as much as was upon it before it reached the end of the stroke. At high speeds even though the exhaust valve opens early in the power stroke the exhaust gas cannot all get out before the piston sweeps the cylinder and hence there will be exerted a pressure on the piston almost equal to the pressure of the gas in the cylinder. This pressure is increased with an increase in speed and the condition is aggravated by a clogged muffler, and poorly designed exhaust passages.

4—Offset cylinders or an offset crankshaft are used to reduce the side thrust of the piston the cylinder wall, which causes wear on the piston and cylinder and increases the friction between the parts.

#### DIFFERENTIAL ON THE JEFFERY SIX Unit Uses Three Spider Pinions—Operates on Ball Bearings

King City, Mo.—Editor Motor Age—Does the motor transmit power to both rear wheels, when turning a corner, with the ordinary type of differential, such as is used in the Ford?

2—Describe the differential used in the new Jeffery six.—R. H. L.

1—Sometimes the motor delivers power to both wheels and again only to one. The conditions under which the turn is made will determine this. It would be possible to take a turn at such speed as to keep one wheel still while the other moved. In most instances where a corner is turned at moderate speed both wheels receive power.

2—The differential of the Jeffery six show nothing radical in general design, except perhaps for the fact that it uses three spider pinions. The unit is shown in Fig. 7. There are three pinion, A, upon a

spider and in mesh with these are two axle bevels, B, or differential gears as they are called. The axle bevels are fastened to the end of the halves of the axle shaft. The Jeffery differential uses ball bearings as the illustration shows.

#### MOTOR CRANKS HARD WHEN COLD Compression Seemingly Poor When Hot—Oil Around Piston

Hudson, Wyo.—Editor Motor Age—1—What can be used for leather upholstery to keep it soft and pliable and prevent cracking?

2—My motor cranks hard and the compression is apparently good when cold, but when warmed up it cranks easy and the compression is not good. How is this accounted for, and is it faulty compression? New rings have been fitted.

3—Where can step-joint piston rings be obtained, and are they considered good? Are leak-proof rings good?

4—For a car weighing 3,300 pounds, without passengers, 34 by  $4\frac{1}{2}$ -inch tires, ratio 3 13-14 to 1, four-cylinder motor,  $4\frac{1}{2}$ -inch bore and  $5\frac{1}{4}$ -inch stroke, is the horsepower sufficient? Would there be ample horsepower for  $3\frac{1}{2}$  to 1 gear ratio? Does 3 13-14 to 1 ratio race motor too much?

5—Would 4-inch tires be large enough for the car?

6—Will one leak-proof ring on the top of each piston be of any noticeable benefit?

7—Does the Elsemann high-tension magneto require magnetizing? If so, how often?—L. V. Denman.

1—Soak a sponge with linseed oil and apply the oil at night and in morning rub the leather clean with a piece of cloth.

2—This condition is the opposite of that of W. A. Gallion's motor cited below. In your case the motor is in use and no doubt the apparent good compression when cold is due to a film of oil between the piston and cylinder wall, making cranking rather hard. After the motor warms up the oil becomes thinner and cranking is not so difficult. It may be added that when cold the bearings are partly dry and the crankshaft and rod do not turn so readily whereas when the motor is warm the bearings are well lubricated and the parts turn easily upon them. In Mr. Gallion's case the motor was just assembled and the oil just poured into the crankcase.

3—Both leakproof and step-joint rings give good service. Step-joint rings may be obtained of Spaeke Machine Co., Indianapolis, Ind.; Wilcox-McKim Co., Saginaw, Mich.; American Piston Ring Co., Newark, N. J.; Eco Mfg. Co., Boston, Mass.

4—The motor should develop ample horsepower to pull the car with a load, and it would do good work with a  $3\frac{1}{2}$  gear ratio on the rear axle and undoubtedly be more economical than with the 3 13-14 ratio. The latter is not too high for such

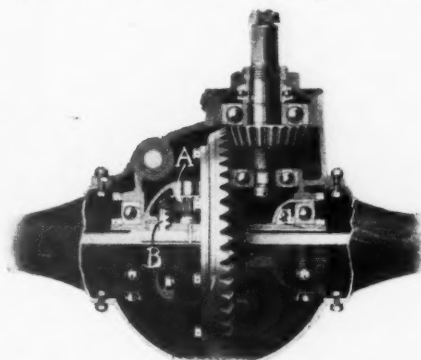


FIG. 7—THE JEFFERY SIX DIFFERENTIAL Showing the spider pinions A and the shaft bevels B

a car and if the country in which it is used is hilly it is not advisable to change.

5—The average 34 by  $4\frac{1}{2}$  inch tire is designed for a load of about 1,000 pounds and the 4-inch will carry about 800 pounds. It would be taking a chance to equip with 4-inch tires for by all means use the larger size and be sure your car is not under-tired. The maker specifies the maximum load the tire should carry and the figure varies with the construction of the tire.

6—Owners who have tried them have stated good results were obtained.

7—The magnets require recharging just as any other permanent magneto magnets do and the charging periods will depend upon the conditions under which the instrument is operated. For example, if the magneto is directly under the exhaust pipe where excessive heat is present the magnets may not hold their charge as long as if the magneto were placed in a comparatively cool spot. Excessive vibration causes the magnets to lose some of their strength.

#### LACK OF COMPRESSION IN MOTOR For a While After Assembly the Engine Turned Over Easily

Elkhart, Ind.—Editor Motor Age—In taking down a small  $1\frac{1}{2}$ -horsepower motor and completely overhauling it, such as grinding the valves, cleaning the piston and the carbon out of the cylinders and everything that it needed, the parts were put together and it was found that it had no compression for a while. What was the cause of this?—W. A. Gallion.

If the gasoline line was not connected to the carburetor and the motor was simply sucking in air and expelling it, the compression would be rather low as compared with the pressure when the motor is in running condition. Since compression increases with a rise in temperature the motor when hot would have a higher compression than when cold. If the motor showed lack of compression for long periods it may have been due to the ring ends being in line and these after working out of line, increased the compression.

#### Michigan License Question

Grand Haven, Mich.—Editor Motor Age—Has the question of the Michigan license been settled in the Supreme Court?—J. E. Palmer.

The Supreme Court has not yet settled this question. Under the present ruling owners of motor cars in Michigan are required to buy the 1914 license, with the understanding that should the court decide against the new law the difference in rate between the present cost and last year's charge would be refunded. The last year's license fee was \$3 flat rate, while the present law requires payment of 50 cents per horsepower, according to the S. A. E. rating.

#### Where to Buy Electromagnets

Detroit, Mich.—Editor Motor Age—Where can I purchase material for making an electromagnet for recharging magnets, or if you know of a maker of the finished product what is the name and address.—M. S.

The Savage Mfg. Co., Chicago, makes them for all voltages and they may be operated by dry cells or from the lighting circuit. The Williams Electrical Co., Fort Worth, Tex., is another maker.



# Americans Develop Art of Wire Wheel Manufacture

## Houk Eliminates Many Useless Operations

By L. V. Spencer

**P**ROBABLY the making of wire wheels in quantities for motor cars is one of the youngest branches of the industry. The growing popular demand for them for large cars as well as their almost general adoption by the makers of light vehicles has opened up a manufacturing field which up to a few months ago was not even scratched.

George W. Houk, a pioneer in the wire wheel business in this country, long ago foresaw the opportunity of producing wire wheels in quantities sufficient to bring the price within reach of the average car buyer. Licensee jointly with another concern for the production in the United States of the triple-spoke-laced wheel under Rudge-Whitworth patents, Mr. Houk set about to simplify the construction in order to get it down to a big production basis, the present Houk wheel having three separate parts being the result.

### Makes 5,000 Wheels Per Day

Last fall the Houk Mfg. Co. took over the McCue plant in Buffalo and laid its

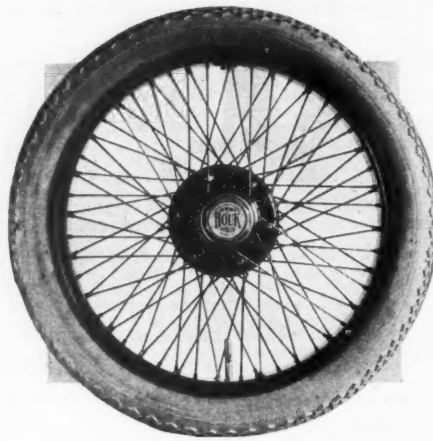


Fig. 1—The Houk wire wheel ready for the road

scribed in Motor Age, consists principally of inner and outer hubs, rim, spokes and clamping nut. Fig. 1 will serve to make clear and the general construction.

in the finished form, with the exception of the drilling, and is a steel stamping which has required twenty-three press operations to finish it from the flat plate from which it was formed.

### Drilling of Spoke Holes

Fig. 5 shows the specially set-up gang drill on which the drilling of the spoke holes is done. The hubs are set up on holders on the drill table. These holders have spindles to take the hubs, while a driving pin also is provided which goes through one of the driving holes in the hub. An indexing attachment revolves the hub on this spindle a given distance, putting it in position for another hole to be made after each drilling operation, until the entire flange circumference has been provided with the properly spaced holes. Thus, after the hub has been put in place on the machine, the operator only has to start the machine, when the holes will be drilled in proper relation to one another. By the use of five drills working together as shown, the machine has a large capacity. One hub comes off the machine every 3 minutes.

As to the inner hubs, these come in the rough form and require in the Houk plant only the various machine operations necessary to finish the inner taper surface, to



Fig. 2—Gang of punch presses used for sinking the cavities in the rims for the nipples and for punching the holes for the spokes. The rims come to the factory in standard form and are first indented, then the holes are punched in the center of the indentations. About 2½ minutes is required to completely perforate a rim in this way

plans for the making of these wheels in quantities. Today the concern has a plant whose capacity is 5,000 wheels per day, which employs about 300 men and which utilizes 90,000 square feet of floor space.

To arrive at this large production, many efficient processes have been devised for the elimination of unnecessary operations and special machinery and attachments to standard machine tools have been installed.

The Houk wheel, which has been de-

In the actual making of these wheels at the Houk factory, one of the first operations is the drilling of the outer hub or shell for the spoke heads. Two series of these spokes run to the inner flange of this hub, while the outside or thrust spokes run to the outer end of the hub. The hub comes to the factory

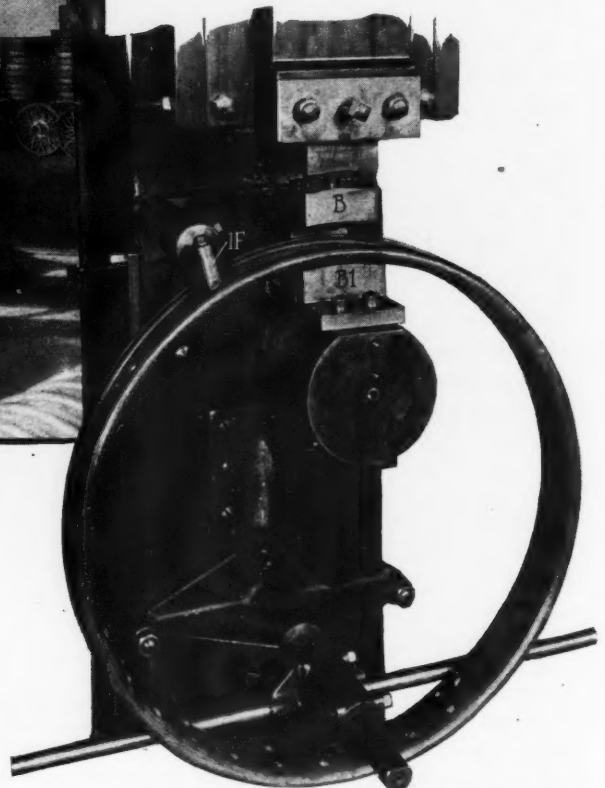


Fig. 3—Closer view of the indenting process in the Houk plant. The rim is placed between the upper and lower blocks B and B1 of the die and the impression made, each operation making a series of three indentations. The indenting finger IF at the left serves to indicate how far the rear must be turned after punching so as to equally space the marks around the rear

thread the end for the nut, to drill the holes for the steel driving pins, and for the bolting to the brake drums in the case of the rear hubs. These operations are all standard machine shop processes and need no special comment.

#### Stanweld Rims Used

Rims used in the make-up of these wheels are Stanwelds, and are received in the standard form just as they would be used in any wood wheel construction. But they must be prepared for the wire spokes and this is a very interesting process.



Fig. 4—Screwing the nipples onto the spokes on special positioning machines in the Houk works. The assembled wheel with the spokes all in place and the nipples started, is placed on the table with the hub over the spindle S. The rim rests on the table N, which is free to revolve independently of the spindle. Positioning blocks which are adjustable to any diameter are carried on this table and bear against the inner surface of the rim. Thus rim and hub are mounted correctly with respect to each other and can turn slightly so as to adjust themselves when the tension is placed in the spokes.

Two kinds of operations are necessary to first indent the rim surface at equally spaced points around the rim and then to punch holes for the spokes in the center of these indentations.

A battery of eight punches, Fig. 2, takes care of this part of the wheel-making. The first two or three are set up for the indenting process, while the others punch out the holes so marked by these indented points. The standard rim is laid on the punch between the two halves of the die, as seen in Fig. 3. The upper part of the die B has three round ended plungers which sink into mating cavities in the lower plate B1, and when the rim is interposed between them, it receives the desired impressions.

These are in a series of three to receive the three spokes which come in groups, so to speak. Naturally, the indentations must be equally spaced around the rim, and to do this there must be a special die for each size of rim so that its punch marks will come a predetermined distance

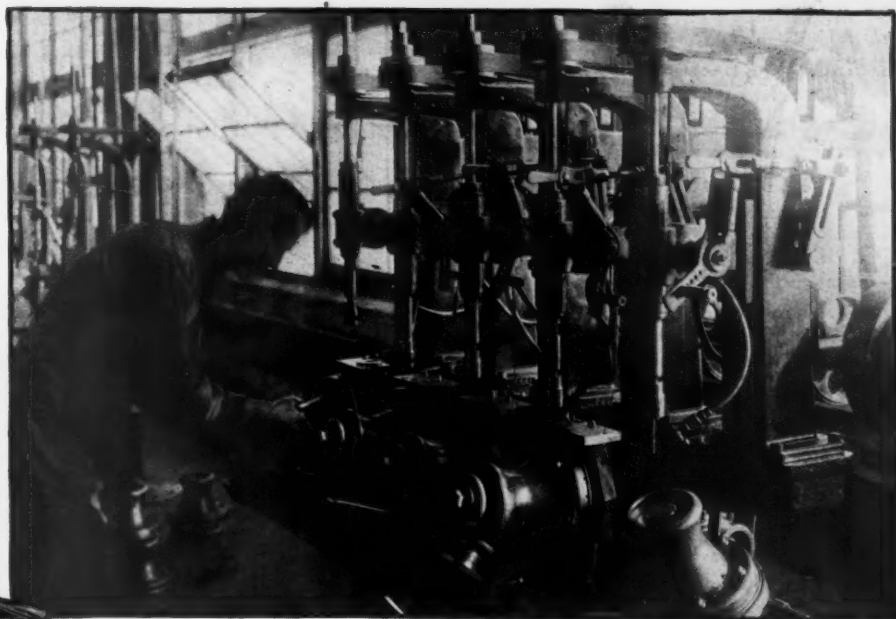


Fig. 5—A gang drill of the Houk factory on which the hubs are drilled for spokes, the several spindles all work at once and with this multiple working one hub can be taken from the machine every 3 minutes.

from one another in order that the spacing will come out even, and besides this an indexing attachment IF is used which locates the distance the rim must be shifted after any set of three impressions has been made. This index IF has a spring plunger which drops into one of the holes when the rim is shifted, and this shows that the spacing is right for the next set of marks. It takes about 1 minute to indent the rim all the way around.

Having thus located the spoke holes in the rim, the next operation is the actual punching of them. This is accomplished with another of the punch presses, one hole being made at a time in the center of the indented points. The operator requires  $1\frac{1}{2}$  minute to perforate a marked rim. When this is done, the holes have the same appearance as if they had a bevel countersink, the indentations being large enough to take the heads of the nipples so that they will be flush with the rim surface when assembled.

#### Efficiency in Assembly

All parts are now ready for the assemblers. Special benches are provided for this work, and the arrangement of the parts entering into the product is noteworthy. The assembly block on which the rim and hub are laid is in the center, while the three different lengths of spokes are placed in little compartments to the left and the nipples in one at the right. Another and larger compartment holds the hubs.

Thus the assembler does not have to move from his position in putting the wheel together, which is an example of efficiency well worth noting. Back of the bench are a number of perforated rims. One of these is put on the bench, then a hub is taken from the pile, following which the lacing takes place and the nipples are started. The assembler does

not put any tension on the spokes, but simply gets the parts together.

#### Tightening the Nipples

Obviously, it is important in the tightening of the nipples that they all place the same tension on the spokes which they hold. Otherwise, the wheel would be warped, or out of true. Special tables are provided for this work as seen in Fig. 4. The assembled wheel is laid on this as shown, with the hub on the spindle S which is free to revolve. The rim lays on the outer table N which may turn independently of the inner spindle. Equally spaced blocks on this table which may be set for any given rim diameter, rest against the inner surface of the rim. With these in place and the hub held down by the nut on the top of the spindle, rim and hub are properly positioned with respect to one another, and the spokes may be tightened up. To do this, a revolving flexible shaft with which the operator is working is used. This has a driving end to engage the nipple head, and screws it up until a certain tension is reached in the spoke, when it will not turn the nipple any further.

First, the tangential or driving spokes which lead to the outside edge of the rim are tightened up. This has the effect of drawing the rim down tightly against the positioning blocks of the table. Then the tangential spokes running to the inside of the rim are tightened, and finally the outside or thrust spokes are adjusted. To tighten all the spokes of a wheel requires about 5 minutes.

The wheel next goes to the inspector, who trues it by tightening certain spokes and loosening others if need be. Protruding ends of spokes are then ground off after which it goes to the enameling room where it is dipped and then baked to set the color.





# Cyclecar Development

## Industry in Need of Efficient Motors

SEVERAL cyclecar makers have reached a turning of ways, a point where either one of two courses of procedure in experiment may be taken up. They are puzzling this and that and wonder which route to take.

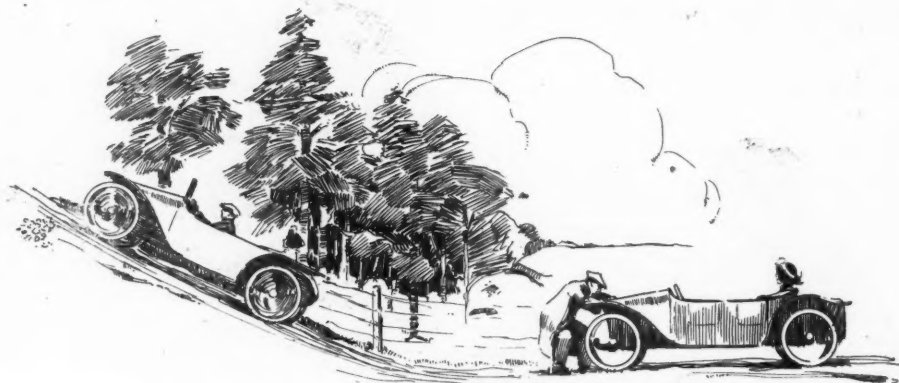
These are mostly makers who with no air-cooled motor experience started out to develop the cyclecar. This article has to do with those who took the tandem-36-inch-tread type of car and fitted twin V air-cooled motors. These pioneers started in early when all that was available was two-cylinder motorcycle motor construction—a construction too light for cyclecars. These motors were fitted with magnetos and were too hard to start. They needed a kind of attention differing from what these men were used to in motors, and hence, largely through a misunderstanding of the way to handle the motors, there was a tendency with the few to look at the four-cylinder water-cooled motor, and to look for its adoption for cyclecars.

Let it be understood that the writer is not against this type of motor or construction if it will do the work as well, but before jumping at conclusions it is only fair to analyze the situation carefully to save any grave mistakes. Is the four-cylinder motor the thing now?

Take a usual type of tandem cyclecar. It is fitted with a 9-horsepower motor and friction drive with 12-inch disks. This outfit, with the V motors as they are now made, is a wonderful car in performance and comfort. The weight with all fittings is under 700 pounds, and the springing superb. Suppose the maker is not used to V motors and wants a four-cylinder. Those now available are beyond the cyclecar limit as a rule, and he looks toward a 15-horsepower unit or thereabouts, with  $2\frac{1}{2}$  to  $2\frac{3}{4}$ -inch bore and say a 4-inch stroke and sees advertisements of 150 pounds weight.

### Light Weight is Wanted

These motors, with radiator and water, weigh nearer 250 than 150 pounds; more than twice the weight of the V twin, and giving less than twice the power. The cyclecar has proved that the lighter the car the more efficient it is, but now if this weight is added a new frame must be made, much stouter, and new front axle construction used. A disk of 12-inch diameter will not carry the power and at least a 16-inch disk is necessary. This adds frame twist and side strains and 40 to 60 pounds weight. The whole car is made heavier until where it weighed originally 700 pounds or under it now, with the new construction, weighs 1,100 pounds



MORE POWER IS NOT NEEDED, BUT MORE QUIETNESS, EASIER STARTING AND MORE FOOLPROOF OPERATION

By William B. Stout

or over, as in one case the writer knows of. The new car is but 4 or 5 miles an hour faster, when the original car was fast enough as it was. It is not so safe, and but little quieter. The upkeep has doubled, and at the same time the car has lost the handiness of the cyclecar which can be pushed about at will like a buggy.

### Refitting the New Motor

In changing to the big motor, all the car's development has to be done over again. The old parts do not do the work, and six months is lost fitting to the new motor the constructions necessary, and it is possible even that when the engineer, unfamiliar with friction drive installation, tries to put 15 horsepower through his friction assembly he may change his mind and go to expensive and noisier gear drive, with less flexibility. Thus added expense piles up and a lessened market for sales, whereas the idea of the new motor was for wider sales.

If the four-cylinder motor is to be used in the cyclecar, it must weigh with all cooling apparatus and water not over 150 pounds and deliver about 10 horsepower average. This, with a motor limited to 71 inches cubic capacity, would make a motor about  $2\frac{3}{4}$  by 3 inches. A long-stroke motor hardly would be advisable on account of small piston size, and hence ring trouble. This motor could be cooled by hopper without radiator, if a really clever engineer got to work on it, or the radiators could be fastened direct along the sides of the cylinders. Overhead valves would give maximum efficiency and a very quiet motor would result.

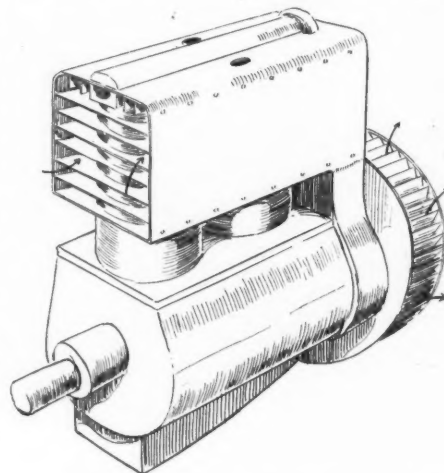
More power could be had, however, by making a twin-cylinder vertical motor with two-throw crank. This type of motor balances very wonderfully mechanically, but the firing balance is uneven. The ex-

plosions are irregular and sound much like a twin V. With a large flywheel and the flexibility of friction drive this uneven firing is no real disadvantage, and especially with a high-speed motor as this would be. The twin vertical motor could be water-cooled or blower-cooled, but in either case could be very light for the power and would be very flexible. A magneto could be used if desired and yet easy starting could be had, and a crank would spin the motor—a thing almost impossible with the V-type.

### Foreign Motor Types

England uses the twin vertical very largely, the G. W. K. friction-drive car with a Coventry-Simplex motor and friction drive having showed a very marked superiority in reliability over other English cyclecars in the long trials of last year, the little motor of under 65 cubic inches driving a very heavy car with the reliability and punch of a four.

This type of motor hardly would be longer than a V twin and would fit into



The twin vertical motor could be blower cooled but must weigh around 100 pounds complete

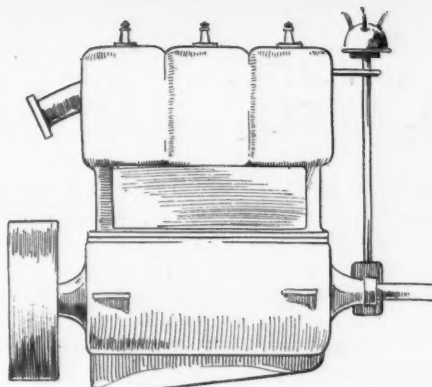


the usual 14-inch width cyclecar frame without projecting through the hood, which would make things more weather-proof.

There is a field of makers waiting for just such a motor, and a firm bringing one out would find an immediate market and a large one.

Another possibility is the three-cylinder motor. This would allow of a larger piston size and greater volumetric efficiency than a four, a shorter motor and an almost perfect balance. The constructional cost would be low with present machinery, and this type is worth a study.

Above all, the weight must be kept down. We cannot have 200-pound motors for cyclecars, for not enough is left for chassis and transmission. A 100-pound motor is the goal.



THE THREE-CYLINDER MOTOR IS A GOOD CYCLECAR POSSIBILITY

The writer at present believes in the V air-cooled twin as the best available power plant for cyclecars. What the fu-

ture may bring is in no man's hands, but depends very largely on how the motor makers of both types wake up.

The average motor maker is a motor car man. He knows you cannot drive a side-by-side motor car with less than 15 horsepower and, judging the cyclecar accordingly, wants to build a motor of that size and type in the belief that they will all have to come to it. The tandem 36-inch tread or the 36 staggered has plenty of power with the present V motors, but wants easier starting and more fool-proofing and quietness—not more horsepower. Where is the maker with vision who will fit in this field? Where is the inventor who will bring out new motor constructions which are demanded for this motor field as new car constructions have been invented for the cyclecar?

## Cyclecar Inquiries on Body and Chassis Construction

### FITTING OF A STREAMLINE TAIL

#### Different Methods Given—Dimensions of Material Used

UTICA, N. Y.—Editor Motor Age—I have a cyclecar and would like to have a cigar-shaped tail on the rear, similar to that on the English Sunbeam. Could Motor Age suggest how I could make a frame for same and also a material to cover it? Would aluminum 1/16 inch thick and 12 inches wide do?—W. Maine.

There are a number of ways of fitting a streamline tail to a cyclecar, but the one as fitted to the Sunbeam is designed for a speed of about 80 miles per hour. For cyclecar speeds, a tail half as long is about right.

The simplest form is the one shown at the top of Fig. 1. This is a tail ending in a vertical edge, shaped like a curved wedge set on end. This can be framed in spruce or angle iron, and covered with 20 gauge sheet steel or sheet aluminum. It can be made into the very necessary luggage compartment by fitting a door D at the top, and is fastened to the car by wooden pieces b b, shown dotted.

For speed work and very light construction the second form can be made up of spruce hoops and 3/4-inch square sticks of the same wood, covered with aeroplane fabric. This will make a very light structure and have the proper looks, but be useless for luggage.

The lower sketch is a compromise, making the tail square in section, wood framed and covered with metal, having also a door so that it can be used for luggage. The tail should be made light as possible, and should not stick out more than foot beyond the rear wheels of the car.

### COST OF SPRINGS FOR A CYCLECAR

#### Wheel and Tire Prices also Given—Some Useful Hints

Wichita, Kan.—Editor Motor Age—Of whom can a first grade front axle, with wheels complete with all connections necessary for steer-

ing be obtained, and what would be the approximate cost?

2—What will a rear axle and wheels, the type with the springs, and axles combined cost, and from whom can they be obtained?

3—What would be the cost of a two-cylinder air-cooled motor and friction wheels, and countershaft?

4—Kindly state the cost of front axle, the type with springs combined, and cost of rear axle that would best suit front axle for same car.—A Patron.

Definite costs are not available on the parts you mention without more definite specifications. Presumably you want a drop-forged axle. You might write the Indianapolis Drop Forging Co., Indianapolis, Ind., for this, or the Engineering Equipment Co. of the same city. The latter firm can furnish the wheels and complete assembly. No one is making the cross-spring type of axle for general sale, but the parts are simple and springs can be had from any spring maker to your specification. If you are to use the twin V air-cooled motor, use 36-inch tread. The springs will cost about \$10 a set and the wheels about \$20. The tires will cost about \$40 per set.

The twin motor with carburetor and ignition will cost about \$95 f. o. b. factory. The friction wheel and spur with jack-shaft to your drawings will cost about \$15, and you can make the rest to your design, as complete friction transmissions

have not been offered for the cyclecar field as yet.

The cross-spring type of front axle is cheaper than the solid axle type and gives a number of advantages.

### TEXAN BUILT CAR 11 YEARS AGO Gives Specifications of Car Which Weighed 250 Pounds

Fowlerton, Tex.—Editor Motor Age—I see in your January 15 issue that you speak of the cyclecar as a new thing in America. What would you say if I told you that one was built eleven years ago, weighing 250 pounds? I had a 3 1/2-horsepower Aster motor purchased from Orient Buck Board Co., the radiator weighed two pounds and was made of brass and copper, the wheelbase was 72 inches, tread 54 inches, seated two, started from seat, friction drive, iron disk on engine, wood on movable counter, shaft operated by pedal, chain to second shaft carrying differential, two side chains to rear wheels, brake on rear wheels, pedal operated, 28-inch wheels, 1 1/2-inch tires, pneumatic filled, lever steering, four full elliptic springs, second-growth hickory, reach or sills trussed with 1/4-inch steel rods, skeleton frame, full lazy back seat leather, padded and cushioned, wood disk was shifted by side lever for all speeds, both forward and reverse, had ball bearings. This car was built in Eminence, Ky.—E. A. Vaughan.

A number of small cars fitted with air-cooled motors were built even previous to the date mentioned, and even manufactured. The real cyclecar, however, dates from the beginning of the serious movement in the building of the tandem-seating Bedelia in France.

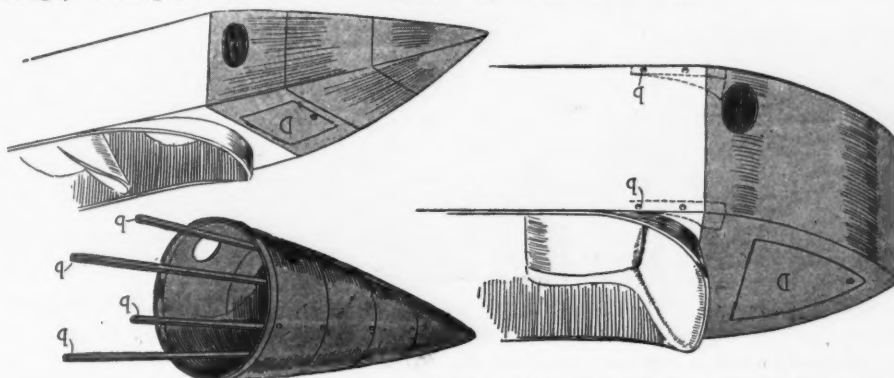


FIG. 1—METHODS OF FITTING A STREAMLINE TAIL TO A CYCLECAR

# Taft Motor Has Overhead Oscillating Slide Valves

## Steam Engine Practice is Utilized

**S**TEAM engine design has been called upon in a new gasoline motor brought out in Springfield, Mass., by W. E. Taft, a mechanical engineer whose name is connected with many successful patents, and Fred Belcher, who formerly drove Knox racing cars. Taft has had considerable experience as a steam engineer and the basic idea of his valve action is markedly similar to that of the Corliss steam engine.

An overhead oscillating slide valve which is held to its cylindrical seat by compression or explosion pressure is the main point of departure from ordinary motor car engine practice. As the valve oscillates on its seat it uncovers the inlet and exhaust ports which are directly above the combustion space, giving a direct flow to the gases entering and leaving the cylinder. The valve is driven from a camshaft and tappet rod in the ordinary way except for the addition of a bellcrank lever to give the oscillating motion.

### Has Straight Valve Ports

Prominent points which stand out in relation to this motor are the straight valve ports and the absence of wearing parts. The motor upon which the experimental work has been done is a six-cylinder,  $4\frac{1}{2}$  by  $5\frac{1}{2}$  Beaver, which has been left untouched except for the installation of the new valve action and cams. On this motor, the clear valve opening for both inlet and exhaust is in the form of a slot  $4\frac{1}{4}$  inches long and  $\frac{3}{4}$  inch in width. The dimensions of the valve opening can be increased or decreased by altering the travel of the valve. The valve timing used

does not vary to any large extent from standard practice in the poppet type, the following being used:

Inlet opens, 4 degrees past top center; closes, 38 degrees after bottom center.

Exhaust opens, 45 degrees before bottom center; closes, 2 degrees after top center.

Below the combustion chamber there is no difference between the Taft motor and the ordinary poppet-valve type. The construction above the latter point, however, differs materially. There is a cylindrical passage in the main cylinder casting directly above each compression space. This cylindrical passage communicates with the combustion space in the top of the cylinder by two slots which form respectively the inlet and exhaust ports. It may be noted in passing that these slots are surrounded by water jackets.

Fitting into the cylindrical opening is a casting which is known as the inner liner. This casting fulfills several purposes. It acts as a seat for the valve, a carrier for the shaft which actuates the valve, includes the waterjacketing for this part of the action and includes also the lubricating system for the valve as it acts on its seat. The seat of the valve is that part of the lining between the two ports.

Through the center of the cylindrical liner runs the shaft or spindle which oscillates the valve. This shaft is of steel and is mounted on two Hess-Bright ball bearings. The shaft carries the two steel studs, which pass through slots in the liner and through these the motion of the shaft is

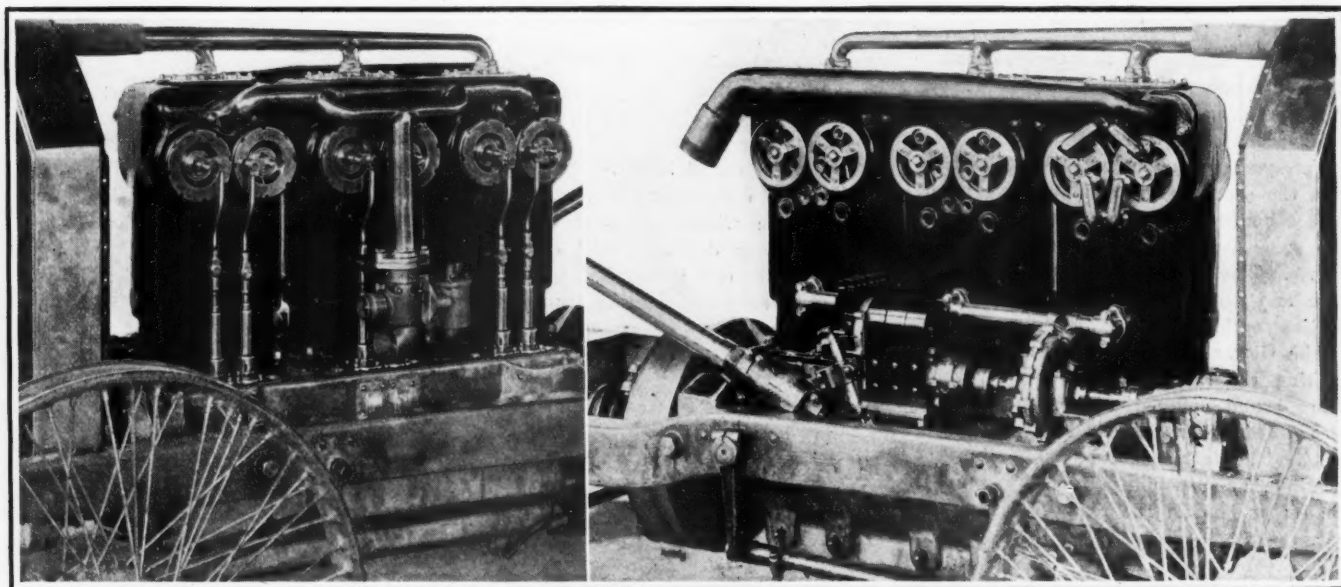
carried to the valve. On each of the studs is a spring which presses the valve against the seat when it is not acted upon by compression or explosion pressure. The motion is given to the shaft by exterior mechanism which may be seen on the next page. As will be noted it corresponds exactly to a poppet action with the exception that in order to secure the oscillating action a bell-crank lever has been used at the end of the valve actuating spindle, and there is only one pushrod, one cam, and one tappet for each cylinder. The entire assembly is shown on this page.

### Both Ports Are Water Cooled

Water for cooling surrounds both ports, through the liner and thereby affords an arrangement for allowing the valve to operate between two waterjackets. Oil is fed by pressure to the seat of the valve where a slot is provided to hold the oil.

On the suction stroke the valve uncovers the intake port and allows the gas to pass through the slot into the combustion space. The valve port is then covered again as the piston comes up on the compression stroke. At the time of explosion the valve covers both ports and the under side of the valve forms the top of the combustion chamber, thus receiving the pressure of the exploding gas and thus being held firmly on its seat by this pressure.

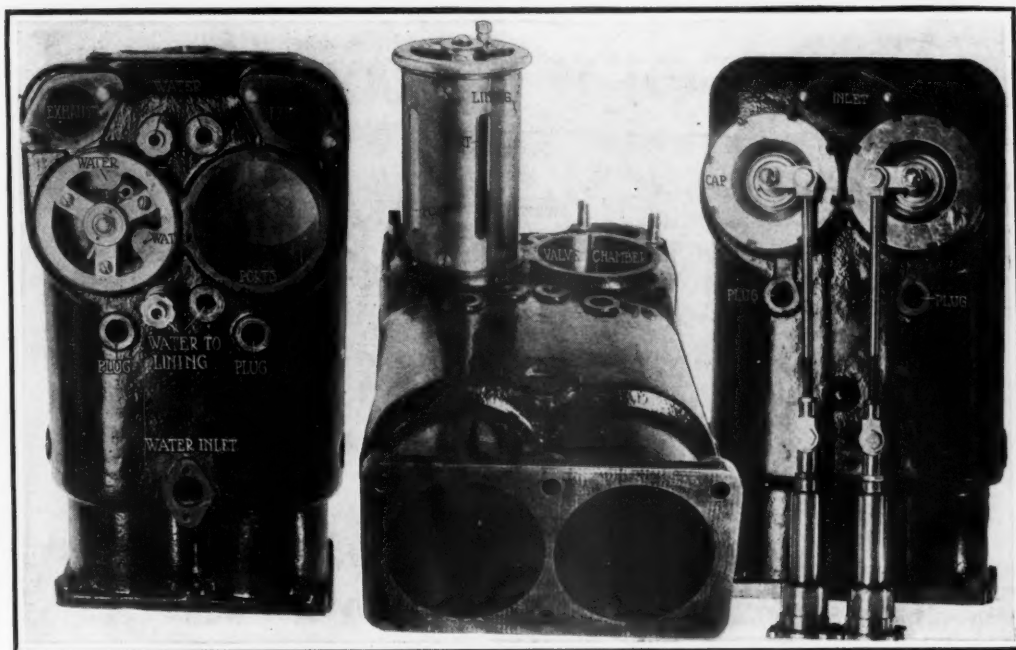
After the firing stroke the exhaust port is uncovered by the valve and the gases pass through the port in the liner which is opened wider at the point where it enters, to take care of the expansion in the gas.



TWO VIEWS OF THE TAFT SLIDE VALVE MOTOR

At the left is shown the intake side of the new creation bringing out the method used to obtain valve oscillation by the use of offset tappet rods and a crank. The cam which operates a valve takes care of the valve mechanism, both for intake and exhaust, thus decreasing the number of push rods one-half. The illustration at the right shows the exhaust side of the Taft motor. Nothing unconventional exists below the valve mechanism.





## PARTS OF THE TAFT MOTOR JUST ANNOUNCED

Here the valve is shown in position. The clear opening, both for intake and exhaust, being in the form of a port  $4\frac{1}{4}$  inches long and  $\frac{3}{4}$  inch wide. The cylindrical valve oscillates and is held to its seat by compression or explosion pressure. A close view of the tappet arrangement is shown at the right

The cam which operates the valve, takes care of the motion of the valve mechanism both for the intake and exhaust, thus cutting in half the number of push rods and tappets. The valve mechanism is held to the cam by a spring which is inclosed in the push rod guide casing.

The fact that at the time of the explosion the under side of the curved valve is exposed to the hot gas in the cylinder leads to the question of the possibility of its warping due to this influence. According to Mr. Belcher, the engine was submitted to an extended run of several

hours under load and at the end of this time a straw color was the highest noted. The motor is at present assembled in the chassis shown on the preceding page but has not as yet been tried out on the roads or on the block. It is expected that a horsepower test will be given it at the laboratory of the Worcester Polytechnic Institute as soon as extensive road tests have been made. It will be surprising if this motor is not found installed in a racing car chassis and entered in contest work during the coming summer with Fred Belcher at the wheel.

## New Rate-Making Principle Possible

### Chamber of Commerce Tackles Railroad Problem

NEW YORK, March 14.—According to J. S. Marvin, general traffic manager of the National Automobile Chamber of Commerce, the most important matter relating to freight rates that has been suggested in some time is the proposal, or suggestion, that has come before the interstate commerce commission, that the railroads assess a separate charge for the so-called "spotting" of freight cars, which apparently means placing them on the sidings of factories having private sidings. Mr. Marvin says:

"This has come up in connection with the proposed increase of 5 per cent in freight rates on eastern railroads, as a means of producing sufficient additional revenue, instead of increasing the freight rate itself, and in the event that the interstate commerce commission decides that the railroads have made out a case which entitles them to a general increase in

their transportation charges."

This plan, if adopted, would inaugurate an entirely new principle of rate making, inasmuch as it would separate the charges for the line haul from the terminal charges. Involved in this question are also the services provided by railroads in the loading and unloading of many kinds of freight, lighterage charges and the delivery of accumulated lots of less carload freight in the so-called ferry cars. All of these services heretofore have been included in the freight rate to or from the cities in which the factories are located.

"Shipping interests appeared before the interstate commerce commission at Washington February 27 to March 4 giving evidence which would tend to show that factory terminals are an advantage to carriers and that the handling of carload lots to and from these sidings cannot be properly designated as free service. Ship-

pers were a unit against the plan, and particularly against adopting it in haste and without investigation by the commission at various points throughout the territory, which it is claimed is the only way in which a proper understanding may be had and discrimination avoided."

Mr. Marvin appeared for the National Automobile Chamber of Commerce at the hearings before the commission. Further evidence will be taken by the commission in connection with lighterage charges at New York and Chicago, tunnel service at the latter city and similar special conditions. The final determination of the matter is not expected for some weeks, and probably months.

### NEW GEARSHIFT IDEA

Toledo, O., March 16—The latest in automatic gearshifts is the work of Hubert A. Myers. From a gearshift in which the various speeds were

selected by a small lever on the steering wheel, Mr. Myers has evolved a mechanical gearshift which eliminates the necessity of using the hands for the selection of the various speeds. The device for the selecting of speeds is connected to the clutch pedal. By tilting the pedal forward, forward speeds are selected progressively.

By merely leaving the pedal in neutral and releasing your clutch, return to neutral from any forward speed is obtained. To enter into reverse the pedal is tilted backward. To return again to neutral the pedal is placed in neutral and the clutch released. The driver either can return to reverse by a direct or progressive movement or he can go from reverse to first in a single movement.

A positive mechanical movement controls all actions it is claimed. One of these gearshifts has been in operation for the last 10 months and up to date it never has failed to enter the speed selected, it is said. Negotiations are now going forward toward the formation of the Toledo company.

### MILLION-DOLLAR HOME FOR FORD

Pittsburgh, Pa., March 9—W. H. Van Tine, the Pittsburgh architect, has been engaged by Henry Ford to plan and supervise the building of a residence on the Ford property near Detroit, Mich. Mr. Van Tine already has started work and will erect a mansion somewhat after the style of the one he built here for M. L. Benedum, the oil operator. The house will be of stone and will be a square of 280 feet. Its approximate cost will be \$1,000,000.



# The Accessory Corner

**E**DOUARD Cannevel, a French engineer, has perfected a headlight for motor cars which utilizes a series of parabolic steps as shown in Fig. 3, by means of which the light given off by the bulb filament is given off in increased direct rays. The rays of light emitted from the bulb must travel a complicated path before leaving the headlight, the result being an usually strong light. The effective depth of the reflector is increased and at the same time the angle of the front opening diminished. Back of the stepped-reflector is an ordinary curved one, the whole being made of glass upon which has been deposited an even layer of silver.

## Housel Ford Starter

The Housel starter for Ford cars is a mechanical device attached on the forward end of the crankshaft by a pall and ratchet arrangement and operated by pedal which when depressed imparts  $\frac{1}{2}$  revolution to the crankshaft. The starter is mounted behind the radiator as shown in Fig. 2. A fan-belt wheel is attached to the crankshaft in place of the one regularly fitted on Ford cars, and this wheel with the lower cog and hand-crank attachment are compactly installed. A flexible steel cable connects the starter arm with the pedal. The starter is sold by the Housel Mfg. Co., East Rochester, N. Y., at \$25.

## Weber Carbureter

The Weber carbureter built in small quantities in the vicinity of Neponset, Mass., where it is manufactured by Weber & Blomquist, is a conventional design with two air inlets, one at the base, which may be connected with a cross manifold and the other an auxiliary valve regulated through a dashpot D. The carbureter uses a vertical air passage extending from the main air inlet to the butterfly throttle at the top, using in this a venturi passage in which is located the spray nozzle. In this nozzle is a needle valve which is raised and lowered by the movement of the auxiliary air valve.

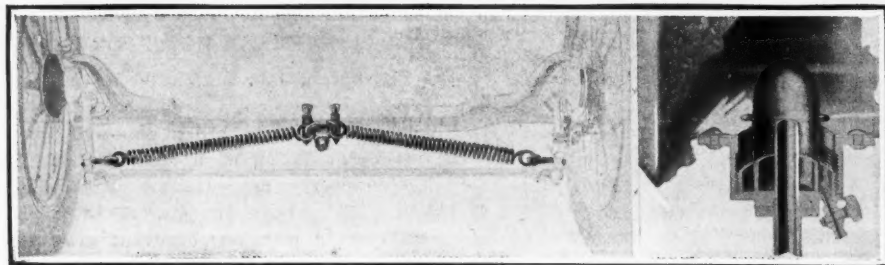


FIG. 1—TWO NEW ACCESSORIES ANNOUNCED RECENTLY

At the left is shown the Mudd steering equalizer which is claimed to keep the steering wheel in a set position and prevent the wheels from turning off the road. The other illustration shows the Pfahler water separator installed in the fuel tank

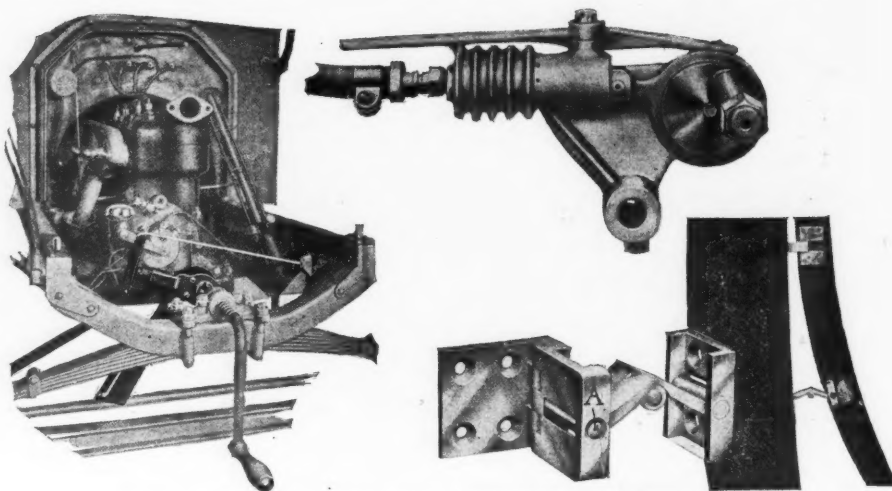


FIG. 2—THREE BOSTON SHOW ACCESSORIES

The Housel-Ford mechanical starter at the left; the upper illustration shows the Colstad motor-driven Ford air pump and at the right is shown the Merrimac hinge for curved doors

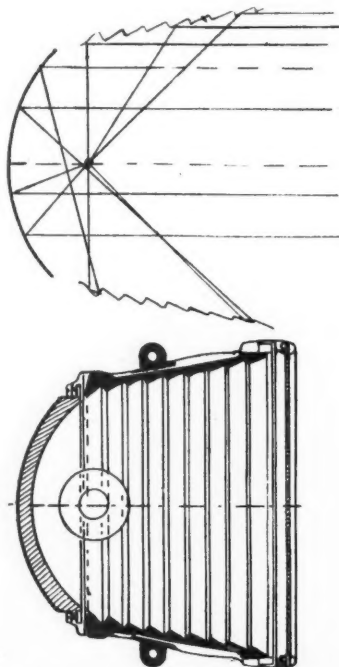


Fig 3—The upper illustration shows how the rays are reflected in the Cannevel headlight. The lamp is shown below

There are two adjustments by which the amount of lift of the valve can be varied. The high-speed adjusting screw HS moves a fulcrum F which supports the lift bar. The left end of this lift bar is acted upon by a short lever L connected with the auxiliary air valve, so that according as the fulcrum F is moved to and fro will the high speed adjustment be adjusted. If the fulcrum F were moved left until it rested directly beneath the support S, which is connected with the needle valve, then there would not be any lifting of the valve, and proportionately as the fulcrum is lifted to the right is the amount of lift increased. There is a low speed adjustment LS. In order to secure the best possible mixing of air and gasoline vapor there is inserted in the top of the venturi a horizontal fixed baffle plate with spokes resembling the spokes in the flywheel of a motor car. The in-rushing air impinging on the beveled faces of these spokes imparts a whirling movement to the inrushing gas and vapor.

## Colstad Tire Pump

The Colstad Mechanical Laboratories, Atlantic, Mass., is marketing a motor-driven tire pump for Ford cars which is claimed to inflate them to a pressure of 55 pounds in  $3\frac{1}{2}$  minutes. The pump is a small single cylinder air-cooled one, with cylinder  $\frac{3}{4}$ -inch bore by  $1\frac{1}{8}$ -inch stroke. The pump is designed to go on the front end of the motor in place of the fan bracket and in installing it it is necessary to take off the present fan, shaft and bracket, and after drilling one  $\frac{1}{8}$ -inch hole in the inside of the fan pulley, according to the templet furnished, the fan is mounted in the correct position on the pump shaft and the entire assembly bolted to the motor. To place the pump

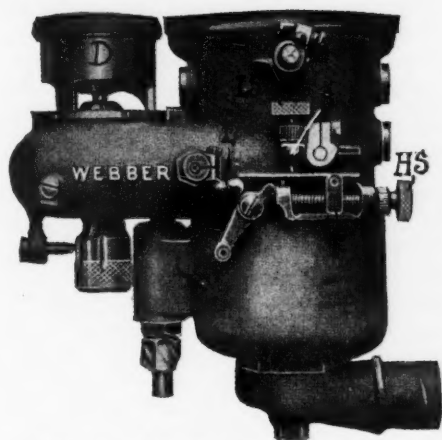


FIG. 4—THE WEBER CARBURETOR  
The low-speed adjustment is shown at LS and the high-speed at HS

in action, it is but necessary to pull a small lever until the eccentric which drives the pump meshes with the fan pulley. The pump shown in Fig. 2 weighs  $3\frac{1}{4}$  pounds and lists at \$7.50.

#### Yankee Fuel Economizer

The Yankee Motor-Economy Co., Boston, Mass., has a simple attachment by means of which water vapor and outside air are admitted into the intake manifold and it is claimed a considerable increase in fuel economy is thereby obtained. The regulation is through a push-button on the dash. It is intended to admit this combined air and water vapor only after the motor is well warmed up. The device consists of a short series of piping, Fig. 6, in which one pipe E leads from the water system to an atomizer D on the dash, and an air pipe C also connects with this atomizer. From this atomizer a pipe P leads to the intake manifold.

When the motor is running, both the water and air in the pipes E and C are heated because they are in contact with the exhaust manifold and when the control valve on the dash is open the suction in the intake manifold draws hot air and water vapor into the mixture. The water is drawn through a strainer and there is a valve on the pipe E for regulating the quantity.

#### Magnetic Trouble Lamp

The Housel Mfg. Co., Inc., East Rochester, N. Y., manufacture a small electric trouble lamp which has a magnetic base, and by means of which the lamp will immediately stick on any iron or steel object to which it is brought into contact. This is made possible by an electromagnet in the base of the cylindrical holder which carries the bulb. The bulb is of 6-candlepower and is provided with 10 feet of flexible cable which can be connected to a lamp socket.

#### Security Spring Spreader

A simple stirrup-shaped spring divider intended to separate the leaves in a spring in order to place oil between them has been brought out by the Security Reliner Co., Montgomery, N. Y. The Spreader,

Fig. 5 is a steel band bent into stirrup form with pointed edges to be inserted between the spring leaves and a thumb-screw for inserting these edges as desired to separate the spring. It lists at \$1.50.

#### Hammond Tri-Vision Windshield

The Hammond Co., Passaic, N. J., manufactures a windshield which does away with mirrors and reflectoscopes. A special mirror attachment at the top of the upper



FIG. 5—SECURITY SPRING SPREADER  
A simple accessory made of steel and easily operated

pane, as shown in Fig. 7, gives the driver a full rear view of traffic conditions by merely raising the eyes. This mirror is the same width as the shield, and is attached to the upper pane by two vertical arms. The mirror may be moved back-

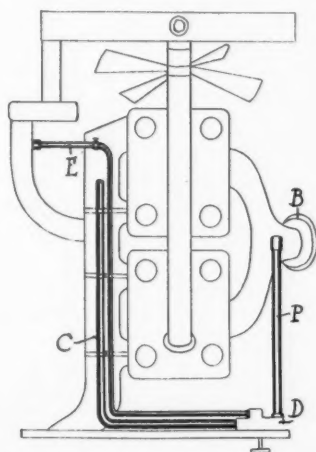


FIG. 6—YANKEE FUEL ECONOMIZER  
Water vapor and outside air are admitted to the intake manifold by this system

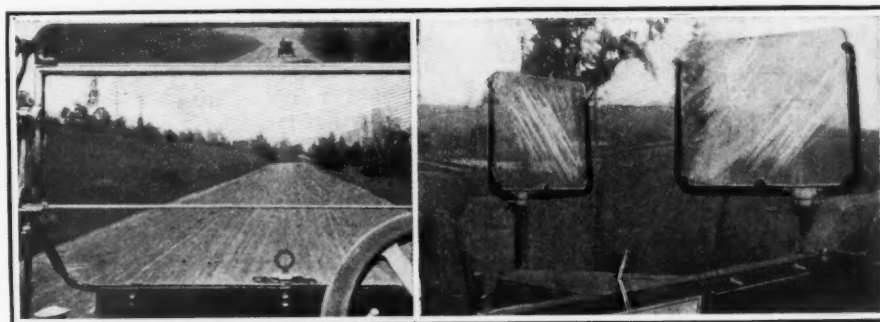


FIG. 7—TWO WINDSHIELDS WITH UNUSUAL FEATURES  
The Hammond Tri-vision at the left gives the driver a rear view of traffic by simply raising his head. The Clark adjustable tonneau windshield is shown at the right

ward or forward, being held in place by two wing nuts, and swiveled on a bearing. The frame of both the mirror and the glass is of the round section. The upper pane may be lowered by moving it forward over the lower pane which is stationary. It has the regular strut attachment to the floorboard of the car, and mounting on the dash. The mirror may be attached to any windshield.

#### Clark Tonneau Adjustable Windshield

A. N. Clark & Son, Plainville, Conn., manufacture an adjustable tonneau windshield which is shown in Fig. 7. The shield is adjustable to any angle, so that no matter from what direction the wind may come it can easily be adjusted to meet requirements. It is made with a variety of bases to fit any car. It is attached to the seat under the cushion out of the way, coming up between the seat arm and cushion. To attach the shields the cushion is taken up and the base placed close to the seat arm sufficiently forward to admit the long side of the shields to turn straight back. They are made of aluminum and finished in black.

#### Mudd Steering Equalizer

The Mudd Steering Equalizer Co., Chicago, announces a device which is designed to keep the front wheels of a motor car in a set position, thus relieving the driver of the necessity of continually moving the wheel to keep the car on the road. The Mudd steering equalizer, as it is called, is claimed to automatically compensate for movement of the steering wheel when a corner is turned, to take up play in the steering mechanism and prevent the steering wheel being pulled out of the driver's hands should an obstacle be struck. The steering equalizer consists of two stout springs fastened to a common block in the middle of the front axle, as shown in Fig. 1 and attached also to the steering knuckle arms. When one spring is compressing the other is expanding and should one spring break and thus tend to throw the car to one side, the other spring automatically releases itself, it is claimed, and the front wheels are kept straight. The Mudd device installed, sells for \$12.

#### Pfahler Combination Plug

Separating water and dirt from the



gasoline before it passes to the carbureter is the object of the Pfahler combination plug, brought out recently by W. Q. Pfahler, Toledo, O. The plug also incorporates a drain cock which when open permits all dirt and water collected to run out. The device consists of a fine mesh screen extending up into the fuel tank, as shown in Fig. 1, and a recess in the bottom which houses the dirt and water trapped. The combination plug is made of brass and sells for \$3.50.

#### Avon Wool Tires

A tire for passenger cars or trucks made of wool cloth, wrapped in concentric layers the same as you would wrap a bandage around a finger, and then the entire tread and sides covered with a rubber coating vulcanized on, is marketed by the American Tire Co., Avon, Mass. The wool cloth is of different thicknesses according to the kind of tire required, thus in a truck tire, where great load-carrying capacity and little flexibility are needed, the layers of wool fabric are about  $\frac{1}{8}$ -inch thick, whereas in a tire intended for light passenger car, the wool would be 1-inch thick. The wool fabric varies in compressibility according to its thickness. These wool wrappings are in as many layers as the tire requires, thus



FIG. 8—DUPLEX-FORD BRAKES

These are of the external type and may be fitted easily by the owner



FIG. 9—HENDRICKS ADAMANTOR

A means by which carbon remover is injected into the cylinders by turning a handle on the dash



FIG. 10—AUTO-HOT GARAGE HEATER

A new type which takes the air for the burner, from outside the building

the 34 by 4 inch tire for a 1-ton truck has a radial depth of  $4\frac{1}{4}$  inches of fabric wrapping.

The shape of the tire and cross section is slightly different from that of the solid rubber tire in that the sides are straighter, which is brought about by all of the layers of wool being of the same width. Some of these tires are claimed to have been driven 11,000 miles on passenger cars. The truck tires are made according to S. A. E. requirements and are guaranteed 7,500 to 10,000 miles.

#### Merrimac Door Hinges

Inclosed hinges for car doors have recently been brought out by the Merrimac Hinge Co., Merrimac, Mass. These hinges differ somewhat in design from the conventional inclosed hinges. Fig. 2 shows the hinge for the bottom of a curved door in which what is designated as a throw linkage is introduced. This throw linkage is readily removable from the hinge proper and throws of different lengths can be used according to the curvature of the base of the door. In order to remove a door with this hinge it is but necessary to take out the screw or hinge bolt A.

A feature of the top hinges is that of a slide engagement which permits of taking the door off by simply lifting it upwards after the lower hinge has been disengaged. This eliminates any necessity of removing screws from the top hinge.

#### Interchangeable Tool

The Currier-Koeth Mfg. Co., Coudersport, Pa., is making a combination tool that has handles like a pliers and is made so that six different heads may be attached. The various tools that can be made include a gas pliers, tin snippers, tire chain tool, pincers, alligator wrench and leather punch. The feature of this interchangeable tool is that it saves the weight of several tools.

#### New Waukesha Motor

A new four-cylinder motor built especially for commercial car service has been brought out by the Waukesha Motor Co.,

Waukesha, Wis., the engine being suitable for cars of from  $1\frac{1}{2}$  to 3-ton capacity. The cylinders, pistons and rings are of semi-steel mixture and particular care is taken in the reaming, grinding and other processes. The motor has a bore and stroke of  $3\frac{3}{4}$  by  $5\frac{1}{4}$  inches, has the cylinders cast in pairs, is lubricated by splash and pressure and is fitted with a flyball governor. The timing gears are of the helical type.

#### Auto-Hot Garage Heater

A new type of garage heater is being marketed by the Kanneberg Roofing & Ceiling Co., Canton, O., which uses illuminating gas as fuel and which was designed with safety-first uppermost. No garage fumes can enter the heater through the agency of the air pipe for the reason the pipe takes its supply of air from outside the building. The heater is constructed so as to eliminate condensation both in the heater and the building. The Auto-Hot shown in Fig. 10 is 36 inches long, 10 inches wide and 36 inches high.

#### Tad Flash System

This device, made by the Toledo Automobile Devices Co., Toledo, O., consists of a series of tubes, each tube being connected with a spark plug of the motor through and in contact with the magneto or coil. By the pressure of a button, the current is made to pass through the tubes. Each tube will then flash in accordance with the actual flash taking place in the cylinder and it is possible by watching this instrument to know what is wrong with each cylinder, whether it is exploding poorly or not.

#### Duplex Brakes for Ford Cars

External emergency brakes for Ford cars are being marketed by the Royal Equipment Co., under the name of Duplex. These brakes are easily fitted to the car and require little time for installation. The bands are lined with Raybestos, a non-burn material,  $8\frac{1}{4}$  by  $1\frac{1}{4}$  inches. The brakes shown in Fig. 8 sell



FIG. 11—MOHAWK NON-SKID TIRE MADE BY THE MOHAWK RUBBER CO., AKRON, O.

for \$10, including two supporting fixtures, pull rods and clips. The Royal Equipment Co. also is marketing brake lining for the gearset bands which is said to prevent chattering and gives added life to the bands.

#### Virtue Foot Pump

The Brown Co., Syracuse, N. Y., has brought out a two-cylinder double-acting hand air pump which is easily operated, it is claimed, and with which a pressure of 200 pounds per square inch is obtainable. On the down stroke air is compressed in one cylinder and on the up stroke it is forced to the tire, and at the same time, a fresh charge of air is drawn into the cylinder. The pump shown in Fig. 12 may be taken apart in a few minutes by inexperienced hands, it is stated. The Virtue pump sells for \$3.

#### Jiffy Tire Tool

Removing a tire with but one tool is said to be accomplished by the Jiffy, a tool made by the R. & B. Mfg. Co., Philadelphia, Pa. The tool may be used as a wrench for removing the valve stem nuts, for forcing back the tire and ring so as to clear the locking device and also for forcing back the bead of clincher tires. It not only does these things but does them with little effort on the operator's part, it is claimed. In Fig. 13 at the top is shown how the tool is applied in removing the valve stem nut the small teeth shown, gripping the nut tightly. In the lower illustration the tool is applied to the rim and by raising the handle as shown the ring and tire are forced back. The tool sells for \$3.50.

#### Hendricks' Adamantor

Introducing liquid carbon remover into the cylinders of an engine by the turning of a valve on the dash of the car is accomplished by the Adamantor, a device marketed by the Hendricks Ad-A-Man-Tor Co., Grand Rapids, Mich. The apparatus consists of a glass container,

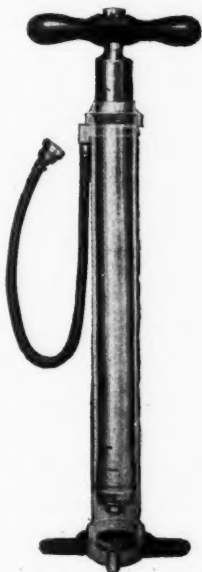


FIG. 12—VIRTUE FOOT PUMP  
A two-cylinder double-acting pump which may be operated easily

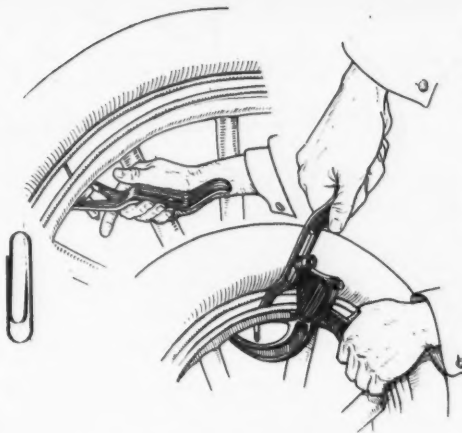


FIG. 13—JIFFY TIRE TOOL  
May be used for many different purposes in tire removal

a valve and suitable piping to the intake manifold of the motor. The jar is placed on the motor side of the dash with the valve on the opposite side and when this valve is turned while the motor is running the carbon remover is drawn from the jar through the intake manifold and into the cylinders, due to engine suction. It is apparent the device may be used also as a primer.

#### Royal-Silent Vaporizer

A mixer and vaporizer which is claimed to affect a saving of from 8 to 47 per cent in fuel is being marketed by Aubrey Peacock-Lawrence, Los Angeles, Cal., under the name of Royal-Silent vaporizer. The device, shown in Fig. 13 is placed between the intake manifold and the mixing chamber of the carburetor and breaks up the small globules of gasoline, causes a more finely divided mixture to be sent to the cylinders and thus affords a means of obtaining more complete combustion. The mixture is whirled around and broken up by the tongues 1, 2, 3 and 4 in the illustration and by the time it gets to the intake manifold is said to be in homogenous form. The vaporizer sells for \$3.

#### Monarch Welding Outfit

A portable welding outfit of the oxy-acetylene type and which is capable of producing a flame of 6,500 degrees F., has been brought out by the Stop-A-Leak Co., Dayton, O., under the name of Monarch. The acetylene and oxygen are contained in tanks and the user of the outfit pays for gas only and returns the tank when empty. The maker of the Monarch outfit sends with each set, blue prints from which the average mechanic can make his own generating plant, thus eliminating the expense of buying gases. The cost of material for the generators will not exceed \$27.50 and requires two days time for building.

#### Sta-Tite Piston Rings

The Sta-Tite Packing Ring Co., St. Louis, Mo., has just brought out a new type of piston ring which is claimed to give added power due to the preservation of compres-

sign, prevent oil from working above the piston and keeps the cylinder bore perfectly round. The ring, shown in Fig. 14, is turned and ground to fit the cylinder perfectly. The ring is made in three parts A, B and C. The body of the ring B has two grooves next to each other. At one point in the groove is a stop S. The parts A and C are fitted on the inside with a piece of wire and the wire fits into the groove in the body. The parts A and C are free to move within limits and the ring as a whole may turn in its groove in the piston.

#### Tomasini Auxiliary Spring

Thomas A. Tomasini, San Francisco, Cal., is marketing an auxiliary spring of odd construction which is claimed to keep the leaves in place at all times and prevent excessive rebound and spring breakage. The Tomasini device is in the form of a strip of spring metal bent up at the ends as shown in Fig. 14 and is clamped in place upon the main spring leaf and when so clamped the center portion A is  $\frac{1}{4}$  inch above the spring proper. A special clip holds the device to the regular spring at the point A.

#### Dumaco Body Polish

A waterproof polish and cleaner especially adapted to motor car bodies is being marketed by the J. E. Dunlin Mfg. Co., Springfield, Mo. When used the polish prevents the adhesion of mud and dirt and gives the body a high polish, it is claimed. A \$1 can is enough to polish a car twelve times.

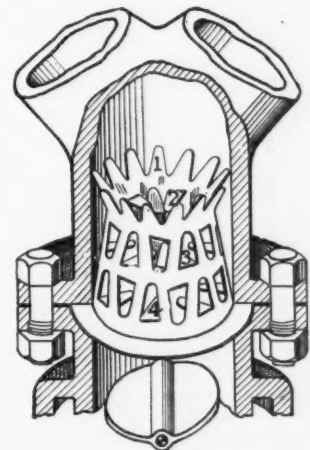


FIG. 13—ROYAL SILENT VAPORIZER  
Breaks up the globules in the incoming gas, it is claimed

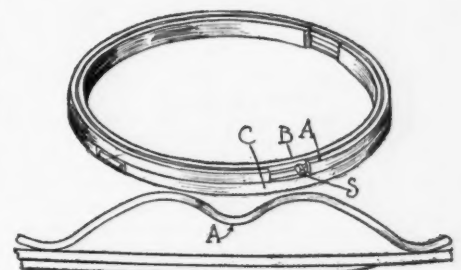
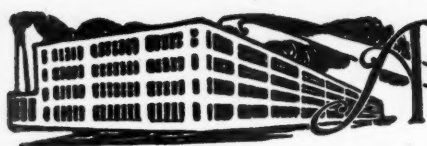


FIG. 14—TWO NOVEL ACCESSORIES  
Upper illustration is that of the Sta-Tite piston ring which is said to be leakproof. The Tomasini auxiliary spring is at the bottom





# Among the Makers and Dealers

**HOWARD Greer Succeeds Cain**—Howard Greer, Jr., has succeeded J. W. Cain, resigned, as chief engineer of the McCord Mfg. Co., Detroit, Mich.

**Hutchinson With Sternberg Company**—Rollin W. Hutchinson has been appointed general sales and advertising manager for the Sternberg Mfg. Co., Milwaukee, Wis.

**To Direct Connecticut Sales**—The Connecticut Telephone and Electric Co., Meriden, Conn., manufacturers of the Connecticut ignition products, has appointed Charles E. Stahl, of Chicago, sales manager.

**Beloit Company Dissolved**—Notice of dissolution has been filed by the Williams Engine and Clutch Co., of Beloit, Wis. C. H. Morse, Jr., was president and chief stockholder.

**Kellogg Opens Detroit Office**—The Kellogg Mfg. Co., Rochester, N. Y., manufacturer of several models of motor-driven tire pumps, has opened a Detroit office and appointed Charles S. Monson branch manager.

**To Open Plant at Once**—J. J. Dauch, president of the Hinde & Dauch Co., which recently purchased the plant of the Sandusky Auto Parts and Motor Truck Co., of Sandusky, O., says the plant will be placed in operation at once. The plant will be used to manufacture tractors and power plants of all kinds.

**Knight with Gauge Company**—W. C. Knight, formerly manager of the Warner Instrument Co. in Cincinnati and Indianapolis, and for the past year with the Stewart-Warner Corp., in Detroit, has been appointed western sales manager for the Boston Auto Gauge Co., of Boston, Mass., manufacturers of gasoline and oil gauges. Mr. Knight has opened an office at 1231 Woodward avenue, Detroit.

**Creditors Refuse Proposed Settlement**—Creditors of the defunct Isch firm of Peoria, Ill., dealer in motor cars and supplies, have refused to accept a proposed settlement on the basis of 25 cents on the dollar. The hearing before the referee in bankruptcy has been fixed for March 25 in Peoria. The Good-year Tire Co. has a claim of \$31,000 against the Isch estate and is opposed to the 25 per cent settlement. The Interstate Automobile Co., another heavy creditor, also is opposed to such a settlement.

**Another Cyclecar Makes Debut**—H. S. Paine, of the Westerville garage, Westerville, O., has built a cyclecar which is being shown there. The car has a wheelbase of 100 inches and a tread of 44 inches. It is driven by a four-cylinder motor with bore and stroke measurements of 2½ by 3¾ inches. The transmission is of the friction type with a double disk. It is planned to manufacture the cyclecars at the plant of the Scarf Gearless Cyclecar Co., recently organized.

**Hangs Cars from Ceiling**—The Overland Automobile Co. this week is moving into an up-to-date, five-story fireproof building on Locust street, St. Louis, Mo. The building contains 25,000 square feet of floor space and can store 300 motor cars. The building is equipped with a modern machine shop and paint room, while the store room contains some \$15,000 worth of parts. In order to store the 300 cars, an ingenious system has been devised. In the concrete ceilings have been poured brackets and hangers. The cars are raised on traveling platforms to the level from which they are to be sus-

pended from the ceilings and steel cables run from the hangers in the ceiling underneath the car, thus holding the car close to the ceiling. In this way a solid tier of cars is hung from the ceiling and another tier is set on the floor, so that every available foot of space is used.

**Lose Valuable Tools Through Thefts**—The L. P. C. Motor Co., of Racine, Wis., has recently suffered heavy losses by the theft of valuable tools, one theft amounting to more than \$350. The night guard has been strengthened to prevent the recurrence of the thefts.

**Besley Plant Almost Completed**—The new plant of C. H. Besley & Co., at Beloit, Wis., is rapidly nearing completion. Operations will be started in the new works about April 1 and the production of polishing and grinding machinery will be more than doubled.

**American Motors Sale March 30**—All tangible assets of the American Motors Co. will be sold at public auction March 30 at the general offices of the bankrupt concern, corner of Illinois and Henry streets, Indianapolis, Ind.

**To Reorganize Rubber Company**—A complete reorganization of the Dayton Rubber Mfg. Co. will be effected following the increase of the authorized capital from \$150,000 to \$1,000,000. The increase in capital was made for the purpose of providing additional machinery. At the annual meeting E. P.

Hooven was elected president; J. C. Hooven, vice-president; E. C. Hooven, secretary-treasurer, and John A. McMillan, general manager.

**Appointed General Sales Agent**—The Union Auto Specialties Co., Brookville, Pa., has appointed Charles S. Monson general sales agent for Union windshields, with headquarters at 1216 Dime Savings Bank building, Detroit.

**English Engineer with Cadillac**—D. McCall White, former works manager of the Crossley Motors, Ltd., Manchester, England, and late chief engineer of D. Napier & Son, Ltd., London, England, has taken a position with the Cadillac Motor Car Co. in an engineering capacity.

**Muir Carbureter Has Detroit Office**—F. H. Berger, formerly chief engineer of the Oakland Motor Car Co., Pontiac, Mich., has opened a sales office in the Dime Savings Bank building, Detroit, for the marketing of the product of the Muir Carbureter Co., Baltimore, Md.

**To Make 3,000 Billikens This Year**—The Milwaukee Cyclecar Co., organized several months ago by Charles and Stanley Eigel, designers of a cyclecar now being marketed under the trade name of Billiken, has been incorporated with \$75,000 capital. The headquarters are at 511 First avenue, Milwaukee. Arrangements have been made to produce and market 3,000 Billikens for 1914. The

## Recent Incorporations

**Allentown, Pa.**—Bee Automobile Co., capital stock, \$10,000; to manufacture truck bodies.

**Boston, Mass.**—Back Bay Auto Supply Co., capital stock, \$2,500; incorporators, W. E. Soule, I. F. Carpenter, W. C. J. Warner.

**Boston, Mass.**—Vehicle Spring Supporter Co., capital stock, \$50,000; incorporators, L. O. Corser, A. W. Woodward, W. H. Woodward.

**Chicago**—M. S. Motor Co., capital stock, \$20,000; general manufacturing business; incorporators, E. A. Biggs, W. R. Getzer, J. Rigney.

**Chicago**—Huma-Swan Co., capital stock, \$100,000; to manufacture motor cars; incorporators, C. G. George, F. Huma, W. A. Swan.

**Cincinnati, O.**—Court Street Garage & Automobile Co., capital stock, \$20,000; incorporators, M. A. Boer, E. A. Hauck, J. H. Ahlbrandt, Jr.

**Cincinnati, O.**—Magrue Motor Car Co., capital stock, \$25,000; to deal in motor cars and supplies; incorporators, W. H. Magrue, W. F. Mothershead, J. A. Durrell, L. K. Slabach, C. H. Barth.

**Cleveland, O.**—Automobile Repair Storage & Supply Co., capital stock, \$5,000; incorporators, T. A. Cretney, R. H. Reed, C. T. Kirkbride.

**Cleveland, O.**—Waite Auto Livery & Garage Co., capital stock, \$10,000; garage and taxicab business; incorporators, A. F. Waite, J. E. Oviatt, C. E. Hubbell, C. R. Brown, W. E. Rogers.

**Dunkirk, N. Y.**—Empire Axle Co., capital stock, \$20,000; to manufacture axles; incorporators, O. F. Hakes, Z. R. Hakes, E. DeHaven Caldwell.

**Detroit, Mich.**—Signal Motor Truck Co., capital stock, \$60,000; incorporators, A. E. Burch, J. Squires, R. M. Wendell.

**Detroit, Mich.**—Woodward Pump Co., capital stock, \$50,000; to manufacture pumps; incorporators, A. Woodward, E. L. Ackerman, C. E. Blasser, C. B. Woodward.

**Erie, Pa.**—Erie Penn Auto Co., capital stock, \$25,000; incorporators, J. Z. Miller, S. Farmer, R. J. Farmer.

**Gulfport, La.**—Smeed Automobile Co., capital stock, \$10,000.

**Savannah, Ga.**—Harris Tire Co., capital stock, \$40,000.

**Lockport, N. Y.**—Lockport Auto Supply Co., capital stock, \$5,000; incorporators, A. L. Hoag, E. H. Huber, J. R. Jelley.

**Louisville, Ky.**—Keeler Battery Co., capital stock, \$400; incorporators, M. B. O'Sullivan, J. W. Gross, G. G. Keeler.

**Little Rock, Ark.**—Gay-Streibich Auto Wheel Co., capital stock, \$125,000; to manufacture wheels; incorporators, G. R. Gay, F. O. Rogers, F. Wittenberg.

**Madison, Wis.**—Scotch Oil Co., capital stock, \$10,000; to deal in lubricants; incorporators, H. C. Smith, A. L. McCullom, and others.

**Mansfield, O.**—Ohio Tire Co., capital stock, \$10,000; to manufacture rubber goods; incorporators, D. Herring, J. Reinhart, N. Kirkpatrick, H. G. Brunner, G. W. Herring.

**New York**—United Motor Owner's Stores, capital stock, \$700,000; incorporators, T. Young, M. Wheeler, H. J. Ryan.

**New York**—Eastern Garage Keepers' Protective Association, capital stock, \$5,000; incorporators, C. S. Walz, T. C. Walz, J. A. Samborn.

**New York**—Mason Seaman Transportation Co., capital stock, \$10,000,000; taxicab business; incorporators, W. B. Harding, J. M. Shaw, P. F. Alther.

**New York**—Israel & Stanke Auto Renting Co., capital stock, \$3,000; incorporators, N. Israel, B. Israel, R. A. Stanke.

**New York**—Engel Crude Oil Engine Co., capital stock, \$15,000; incorporators, H. Engel, W. L. Smith, J. M. Hanford.

**Newark, N. J.**—Elker Carburetor Co., capital stock, \$100,000; to manufacture carburetors; incorporators, T. B. Elker, H. Elker, C. W. Burroughs, B. B. Smith.

**Philadelphia, Pa.**—Lincoln Motor Car Co., capital stock, \$2,000; incorporators, F. R. Hansell, George Martin, S. C. Seymour.

**Rochester, N. Y.**—Motor Gas Service Station, capital stock, \$1,000; to deal in fuel supplies; incorporators, W. D. Elliott, J. K. Elliott, W. R. Gilman.

**Springfield, O.**—Springfield Mend-A-Leak Co., capital stock, \$10,000; to manufacture and deal in motor car supplies; incorporators, R. C. Bancroft, E. Garner, H. L. Slager, I. Tennant, H. K. Horn.

**Salt Lake, Utah**—Apperson Motor Car Co., capital stock, \$15,000; incorporators, L. H. Beechcraft, A. W. Schooler, G. F. Horn.

**Toledo, O.**—American Juvenile Auto Co., capital stock, \$10,000; incorporators, C. Murphy, W. C. Binns, A. C. Luken, L. M. Smith, J. H. Frick.

**Weedport, N. Y.**—Whitwood Corp., capital stock, \$25,000; to manufacture trucks; incorporators, C. E. Whitwood, C. S. Caywood, T. M. Osborne.

**Youngstown, O.**—Electric Auto Service Co., capital stock, \$5,000; incorporators, A. F. Calause, M. M. Conroy, J. V. Murphy, P. J. Jones, D. W. Mumaw.

**Youngstown, O.**—Consumers Auto Supply Co., capital stock, \$10,000; incorporators, C. N. Jackson, M. M. Reese, C. L. Baldwin, A. V. Hinman, R. E. Robinson.

company owns patents on light car or cycle-car transmissions and rear axles.

**Transfers Headquarters to Detroit**—The Aluminum Castings Co., Detroit and Cleveland, has decided to transfer its headquarters from Cleveland to Detroit.

**Wanted: Motor Car Factory**—The Georgia Chamber of Commerce, headquarters at Atlanta, announces that one town in that state is ready to receive a motor car factory with open arms and that additional information will be furnished on request.

**Moore Leaves Maxwell Company**—John A. Moore, traffic manager of the Maxwell Motor Co., has resigned to assume the same relations with the Ajax-Grieb Rubber Co. and the Briscoe Motor Co., with headquarters in New York. Mr. Moore is the last of the old U. S. Motor Co. officials to transfer his energies to new fields.

**Souther Joins Ferro Company**—Henry Souther, for several years consulting engineer to the A. L. A. M. and during 1911 president of the S. A. E., has been elected vice-president and general manager of the Ferro Machine and Foundry Co., Cleveland. Mr. Souther formerly was associated with the Pope Mfg. Co., of Hartford.

**Fire Destroys Ten Broeck Office**—Fire destroyed the office of the Ten Broeck Tyre Co., 840 South Twenty-sixth street, Louisville, Ky., last week, causing a loss of \$5,000. The main plant, some distance away, was not damaged. Officials of the company announced that the fire would not hinder the factory in its working of night and day shifts to keep up with the business demands.

**Additions to Abbott Plant**—As a result of the addition of three new departments, the Abbott Motor Car Co. of Detroit is now doing its own body trimming, top work and painting. These additional departments have made it necessary to add a three-story addition to the plant. At the recent annual meeting of the company, the following officers were elected: Edward F. Gerber, president; M. J. Hammers, vice-president, and Ferris B. Fick, secretary-treasurer.

**Roberts Standard Sales Manager**—W. M. Roberts, formerly general sales manager of the Stewart Iron Works Co. of Cincinnati, O., has resigned from that corporation to accept a similar position with the Standard Motor Truck Co. of Ohio, with supervision over sales not only in this country but abroad. He has established his headquarters at the company's sales offices in Cleveland, O. The Standard company has accepted plans for additions to its Warren, O., plant, which will provide for a 400 per cent increase in its output.

**Studebakers Given Block Test**—The Studebaker Corp., after a long series of experiments, has fitted up a new factory building with apparatus by which each complete chassis is given a thorough and complete block test before it is handed over to the road tester for final approval. A chassis comes to this test complete except for body and wheels. It is attached by its rear axle to a large brake equipped with speedometer, pressure dial and other devices. The chassis starts by its own electrical system and runs under its own power while skilled workmen test not only the power and flexibility of its motor but also go over in detail every adjustment of gear and bearing. The definite nature of the result attained and the unusual facility for the detection of noise and vibration make this method of adjustment absolutely accurate, for each car must score a certain definite record before passing along for road test and completion. Thirty chassis are handled simultaneously in this test which supplements prior block tests of motors and rear axles. So closely does the apparatus imitate actual conditions of use that hill-climbing and muddy road

work can be given at will during its progress.

**Consulting Engineers Retire**—The Winckler Engineering Co., of Racine, Wis., organized last year to engage in the practice of motor car engineering as consulting experts, has filed notice of dissolution.

**Goodrich Officers Re-elected**—At the annual meeting of stockholders of B. F. Goodrich Co., all directors and officers were re-elected for the coming year and W. O. Rutherford elected as assistant sales manager.

**European Makers Adopt Rushmore System**—In addition to the Lancia, whose adoption of the Rushmore system was announced some time ago, the following European concerns have contracted to use Rushmore equipment regularly on all their cars: Fiat, Bianchi, Isotta-Fraschini and De Dion-Bouton.

**Starter Company Purchases Plant**—The Walker Starter Co., of Laporte, Ind., has just purchased the property in which it has been operating, which includes two lots and buildings on Monroe street, Laporte. The company is capitalized at \$30,000 and its officers are Frank H. Walker, president and manager and inventor of the device; Ed L.



#### SHOWS, CONVENTIONS, ETC.

March 16-21—Cedar Rapids, Ia.  
March 17-21—Boston truck show.  
March 21-28—Maritime show, St. Johns, N. B.  
March 26-31—Show, Racine, Wis.  
March 30-April 4—Denver show.  
April 12—Show, Palermo, Sicily.  
April 12-19—Austrian show.  
April 14-18—Deadwood, S. D., show.  
September 26-October 6—Berlin show.  
June 23-26—S. A. E. summer meeting, Cape May, N. J.  
October 16-26—Paris show.  
November 6—Olympia show.

#### CONTESTS

March 1-25—Tour of France.  
March 2-20—Army four-wheel drive tractors endurance tests, France.  
April 19-29—Coupe de Tourisme, 1,000-mile cyclecar and light car endurance test around France.  
April 22—Track meet, Bakersfield, Cal.  
May 25-26—Targa Florio race, Sicily.  
\*May 30—Indianapolis 500-mile race.  
May 30—New York track meet.  
May 30—Track meet, Providence, R. I.  
June 1—Florio cup race, Island of Sicily.  
June 6-7—Track meet, St. Louis, Mo.  
June 10-11—Isle of Man road races, Great Britain.  
June 17-18—Hill climb, Uniontown, Pa.  
June 30—Track meet, Sioux City, Ia.  
July 3-4—Road races, Tacoma, Wash.  
July 4—French grand prix, Lyons.  
\*July 4—Three hundred mile race, Sioux City, Ia., speedway.  
July 4—Track meet, Providence, R. I.  
July 17-18—Speedway races, Seattle, Wash.  
July 25-26—Belgium grand prix road races.  
August 15—Le Mans cyclecar grand prix race.  
July and August—French army truck subsidiary trials.  
August 2-9—Six day cyclecar reliability in French Alps.  
August 16—Coupe Internationale; light car race, Le Mans.  
August 17—Grand Prix of France, Le Mans.  
August 28-29—Road races, Elgin, Ill.  
September 5—Track meet, Milwaukee, Wis.  
September 6-7—Italian grand prix.  
September 7—Track meet, Providence, R. I.  
September 9—Speedway races, Pomona, Cal.  
September 9—Road race, Corona Beach, Cal.  
October—Kerosene motor tests, Paris.  
October—Gallion hill climb, Paris.  
October 2-3—Track meet, Oklahoma City, Okla.  
October 2-3—Track meet, Trenton, N. J.  
November 8-11—Track meet, Shreveport, La.  
November—El Paso-Phoenix road race.

\* Sanctioned by A. A. A.

Walker, vice-president; W. K. Loughborough, secretary and treasurer, and Dwight L. Loughborough, sales manager. The company manufactures starters for motor cars, traction engines and stationary engines.

**Goes With Kelly-Springfield**—Howard B. Limric, who resigned as manager of the New England branch of the B. F. Goodrich Tire Co. recently, has accepted the position of manager of the branch of the Kelly-Springfield Tire Co. in Boston.

**Form Washington Section**—A Washington section of the Electric Vehicle Association of America has been formed with the following officers: Chairman, E. S. Marlow; vice-chairman, R. B. Emerson; secretary-treasurer, C. M. Marsh. Monthly meetings will be held.

**Tylers to Build Cyclecar**—Frank J. Tyler and his brother Lucius, both of whom headed the Maxwell Co. of Boston a few years ago, have re-entered the motor field to manufacture a cyclecar called the Bantam. It is being made in Boston at the factory of the Lenox Motor Car Co. Salesrooms have been opened on Boylston street.

**Ten Men Go On Strike**—Because of a reduction of 25 per cent in the wages of a number of employees of the Mansfield Tire and Rubber Co. of Mansfield, O., recently a strike of several departments was declared. In all ten men left their work because of the cut in wages. A committee was named to confer with the manager of the plant.

**Take Possession of New Factory**—The Gananoque Spring and Axle Co., of Gananoque, Ont., has moved into the new spring works that was built to replace the old works destroyed by fire last October. The building, which is much larger than the one destroyed, is absolutely fireproof, being built of stone, brick and reinforced concrete, with steel trusses.

**Frisco Fair Motor Built**—For the first time in the history of world's fairs, motor trucks are being used to haul the material used in the construction of the Panama-Pacific exposition. A horse on the exposition grounds would be somewhat of a curiosity as in every instance motor cars are being used. While the site is well covered by the exposition's own standard gauge railway, short hauls are necessary even for those materials transported by ship to the ferry slip and thence by rail to the part of the ground designated.

**Studebaker Dealers Organize**—Dealers handling the Studebaker line in New England now have an organization to promote good fellowship and increase the popularity of that make of car in their territory. It is known as the New England Association of Studebaker Dealers and was formed during the Boston show with the following officers: Joseph Donovan, Boston, president; Guy L. Murdock, New Bedford, vice-president; A. R. Davis, Worcester, secretary; Charles Goodwin, Providence, treasurer; J. B. Manley, Brattleboro, Vt., A. W. Horton, Portsmouth, N. H., and the executive officers, directors. Meetings will be held at frequent intervals at the different cities in rotation.

**Cyclecar Agencies Placed**—During the motor show in Boston agencies were closed for representation of about all the cars exhibited that had not previously been represented. The Euclid was taken by W. A. Bryant & Co.; the Merz by M. H. Chase, who has the Stutz; the Mercury by the Victor Motor Car Co.; the Economy by W. A. Maggill; the La Vigne by Charles J. Fischer, and the Trumbull by Green & Co. The Euclid agent is head of a big electric company; the two men handling the Economy and La Vigne have been in the truck business and the Trumbull agent is a business man not identified with the motor industry. F. H. Buffum, builder of the Laconia, is to open salesrooms in Boston for his car.





# Brief Business Announcements



**MOVILLE, Ia.**—A garage has been opened here recently by the Motor Service Co.

**Hartford, Conn.**—The Universal Auto Co. has taken the agency for Knight tires in this vicinity.

**Columbus, O.**—The Star Vulcanizer Mfg. Co., 274½ North High street, has placed on the market a complete vulcanizing outfit known as the Star.

**Anderson, Ind.**—Ralph Smith, Cole dealer at Anderson, Ind., has changed his firm name from the Anderson Automobile Co. to the Automobile Sales Co.

**Columbus, O.**—The Auto Repair Co. is the name of a new repair shop opened by R. L. Shumaker in the rear of 170 North Fourth street, Columbus, O.

**Helena, Mont.**—The T. C. Power Co. has opened a new garage and motor car department in Helena, at the terminus of the Butte-Helena motor road.

**St. Louis, Mo.**—The Noyes Auto Repairing Co., 3124 Locust street, has gone out of business and the Noyes-Brocksmith Co. will take its place at the same address and continue in the general repair business.

**Springfield, O.**—E. D. Valentine, owner of the King garage, has purchased a site on North Fountain avenue, upon which he will erect a modern garage. Mr. Valentine is the oldest dealer in Springfield and handles the Studebaker and Chandler.

**Beloit, Wis.**—Bert Allen, formerly manager of the Vale garage at Beloit, Wis., has established a factory in Beloit for the manufacture of a device to facilitate starting cold engines. The appliance is designed to heat the intake manifold and uses six dry cells. Patents have been granted Mr. Allen.

**Milwaukee, Wis.**—A new welding company which intends to specialize in motor car and boiler repairs has been organized under the name of Wisconsin Welding & Cutting Co. and established headquarters at 163-165 Barclay street, Milwaukee. A large installation of oxy-acetylene apparatus has been installed.

**Milton Junction, Wis.**—L. A. Lumm, who established a garage in connection with his blacksmithing and carriage building business at Milton Junction, Wis., some time ago, has disposed of his other interests and will devote all of his time to the garage and sales department. He may build a new garage building this year.

**Frankfort, O.**—Lee S. Putnam has purchased a half interest from W. L. Hickey & Son in the motor car business in Frankfort and the concern will be known as the Hickey-Putnam Auto Sales Co. The firm has the agency in Ross county for the Overland; Ross and Pike counties for the Hudson, and Concord, Union and Twin townships for the Ford.

**Indianapolis, Ind.**—E. B. Cook, Jr., has succeeded H. L. Smith as Indiana manager for the Kelly-Springfield Tire Co., with headquarters here. Mr. Smith has been advanced to the position of manager of the company's sales branch at St. Louis.

**St. Louis, Mo.**—The firm of Newell & Eccles, recently formed here to market the Empire gasoline economizer, has been dissolved. H. M. Newell, Jr., has been made sales manager of the firm that makes the economizer—the Brown-Taylor-Greene Co. Chicago. George C. Eccles, the other member of the dissolved firm, will have charge of the northern district of the Brown-Taylor-

Greene business. A dealer for the St. Louis district will be appointed soon.

**Columbus, O.**—Carl H. Pausch has opened a vulcanizing repair shop at 608 South High street.

**Newark, O.**—The Wolfe-Ferguson Co. is the name of a new repair shop opened at 58 Hudson avenue, Newark, O.

**Columbus, O.**—The North Side Tire Repair Co., 1346 North High street, is the name of a new repair shop opened by W. E. Layton.

**Tacoma, Wash.**—Dr. C. E. Taylor, agent for Overland and Chalmers cars in Tacoma, has recently added Pennsylvania tires to his lines.

**Philadelphia, Pa.**—C. C. Ferry has been appointed manager of the local sales agency of the Lee Tire and Rubber Co., succeeding R. R. Haynes.

**Edmonton, Alta.**—The Motor Car Supply Co., Ltd., of Calgary, Alta., has opened a branch house here at 524 West Jasper avenue. This is the first accessory jobbing house in this city.

**St. Paul, Minn.**—The Dayton Cyclecar Sales Co. has been formed to sell the Dayton cyclecar in Minnesota, Montana and the Dakotas. Headquarters are at 729 East Seventeenth street.

**Fall Creek, Wis.**—Edwin Stubbe and Walter Stelter of Fall Creek, Wis., have formed a partnership under the style of Stubbe & Stelter and will build a garage. The concern will handle the Overland, Maxwell and Ford.

**Milwaukee, Wis.**—The Milwaukee Tire & Supply Co., 457-459 Milwaukee street, Milwaukee, Wis., has been appointed Wisconsin distributor for Diamond tires and Hess-Bright bearings. The company has been state distributor for Republic tires for several years.

**Beloit, Wis.**—Wayne Coakley and Earl Young, Beloit, Wis., inventors of a new type of gasoline gauge, have organized Coakley, Young & Co. to engage in the manufacture of this and other specialties on a large scale. A factory has been established at 1027 Hackett street, Beloit, but later the company expects to build its own plant. The gauge is of the mercury-float type.

**Chicago.**—A. A. Bischoff, formerly advertising manager of Catalogue Systems Co., Chicago, has resigned his position with that concern to engage in the accessory business under the firm name of the Consumers Auto Supply Co., locating at 123 West Madison street, Chicago. E. J. Lloyd, formerly of the American Ever-Ready Co., Chicago, succeeds Mr. Bischoff.

**St. Louis, Mo.**—The Oldsmobile agency in St. Louis has been discontinued because of the difference between Bart S. Adams, of the Oldsmobile Co. of Missouri, and H. A. Allen, traveling sales manager for the Olds Motor Works. Adams has closed his accounts with the Olds company and is shipping back parts and cars he has here. It is probable the machine will not be represented in St. Louis for some time.

**Fond du Lac, Wis.**—H. W. Mable and Fred Barnes, of Fond du Lac, Wis., and Clement Zingsheim, of Shawano, Wis., have purchased the garage and business of the Anderson Motor Car Co., 36 West Second street, Fond du Lac, Wis., and will continue the business under the name of Barnes, Mable & Zingsheim Co. The Paterson agency held by the Andersons for several years goes to the new owners. An accessory and supply

store and motor livery will be operated in connection with the garage.

**Washington, D. C.**—The Selby Co., Paige-Detroit agent has removed to 1805 Fourteenth street N. W.

**Philadelphia, Pa.**—W. F. Rudolph, 1308 Girard avenue, has completed negotiations for the local agency of the Pioneer cyclecar.

**St. Louis, Mo.**—E. W. Staley, who until recently was St. Louis manager for the Diamond Rubber Co., has been made local manager for the Miller Rubber Co.

**Washington, D. C.**—Probey-Haynes Motor Co., agent for the Haynes and Davis, will remove from 1230 Wisconsin avenue to larger quarters at 1223 New York avenue.

**Washington, D. C.**—Charles Rubel & Co. has opened an accessory store at 1312 Fourteenth street N. W., and will feature a number of well-known motor car specialties.

**Sacramento, Cal.**—Casey and Turtin, Cole dealers, have dissolved partnership, J. S. Casey taking over the business and changing the firm name to the Cole Motor Co.

**Detroit, Mich.**—B. N. Beedon, formerly with the Firestone Tire and Rubber Co. and later with the American Volturette Co., has taken a position as traveling representative of the Standard Motor Truck Co.

**Port Washington, Wis.**—Walter Erler and Arthur Aggen, of Port Washington, Wis., have formed a partnership under the name of Erler & Aggen and leased garage space. The concern will handle the Buick in Ozaukee county.

**Milwaukee, Wis.**—The Rayfield Motor Sales Co. has been organized by William R. Jurack, of Milwaukee, to establish a cyclecar garage and agency business, handling the Rayfield cyclecar. Headquarters are at 1230 Hadley street.

**DePere, Wis.**—The Toonen and Barlament Garage Co., of DePere, Wis., has changed its name to Toonen-Barlament-Wright Co., Carl Wright having taken an interest. Mr. Wright will act as manager of the business. The company handles the Ford.

**Laporte, Ind.**—The Indiana Auto Supply Co., of Laporte, Ind., which was incorporated a short time ago, with a capital stock of \$10,000, has opened a store at 607 Michigan avenue. The feature of the stock will be motor car tires and supplies. A complete line of Ford accessories will be carried. The company also will do vulcanizing.

**Louisville, Ky.**—Dennis H. Long, formerly local manager of the United States Cast Iron Pipe and Foundry Co., has been chosen vice-president and general manager of the Southern Motors Co., succeeding George S. Danaher. Allen L. McCormick, who organized the concern, also has resigned. Lee Miles will continue as president and Graeme Botts will remain as secretary and treasurer. The Southern Motors Co. handles the Packard, Hudson, Overland and Detroit electric.

**Danville, Ill.**—The Danville Auto Dealers' and Repair Men's Association was organized at a meeting of dealers of Danville this week. Officers were chosen as follows: President, Burt Jones; vice-president, H. Linne; secretary, D. R. Seawright; treasurer, William Holmes. The new organization succeeds the Danville Auto Dealers' Association, which was organized a year ago. Preliminary steps were taken to establish a uniform system of charging for repair work. Every member agreed to pay a forfeit for proof that prices are not maintained.

## Recent Agencies Appointed by Motor Car Manufacturers

## PASSENGER CARS

Town	Agent	Make	Town	Agent	Make
Anita, Ia.	C. O. Harris	Metz	Lebanon, Ky.	Ivo L. Canary	Metz
Ansley, Neb.	J. C. Hyatt	Empire	Las Cruces, N. M.	James Cox	Haynes
Avondale, Pa.	M. F. Morris	Maxwell	Lincoln, Neb.	L. O. Holmes & Co.	Jeffery
Anita, Ia.	L. R. Gallher	Hupmobile	Logan, Ia.	William Haskins	Metz
Akron, Ia.	E. E. Mellen	Hupmobile	Lyons, Neb.	C. O. Swanson	Buick
Atkinson, Neb.	W. H. Hitchcock	Hupmobile	Lynch, Neb.	R. N. Wellington	Buick
Alcester, S. D.	C. A. Frost	Hupmobile	Lebanon, N. H.	A. J. Blamondon	Maxwell
Atlantic, Ia.	White Pole Garage Co.	Haynes	Lowell, Mass.	C. W. Armstrong	Maxwell
Augusta, Me.	W. S. Ladd	Haynes	La Grange, Ky.	La Grange Auto Co.	Maxwell
Albany, N. Y.	Adirondack Motor Car Co.	Cole	La Grange, Tex.	T. W. Lenders & L. Hausmann	Maxwell
Amarillo, Tex.	C. G. Maddox	Cole	Lamarine, O.	Murdock & Kirby	Maxwell
Arlington, Ill.	R. L. Kemp	Cole	Leola, S. D.	John Dexter	Maxwell
Broken Bow, Neb.	Frank Labertew	Henderson	Lansdale, Pa.	James Speirs	Maxwell
Boise, Ida.	Central Auto Co.	Maxwell	La Grande, Ore.	L. C. Smith	Maxwell
Brooklyn, N. Y.	I. C. Kirkham	Maxwell	Lewes, Del.	William E. Walsh	Maxwell
Bellville, Tex.	J. D. Palm & E. Harigel	Maxwell	Little Falls, Minn.	Dr. J. H. Newman	Hupmobile
Brady Island, Neb.	Lloyd Power	Maxwell	Little Rock, Ia.	Bromley & Meyers	Hupmobile
Bridgeport, Ill.	S. B. Postlethwaite	Hupmobile	Lynchburg, O.	Kesler & Oldaker Auto Co.	Overland
Bloomfield, Neb.	J. B. Gossard & Co.	Hupmobile	Leesburg, O.	Ernest W. Pavey Auto Co.	Overland
Boston, Mass.	Victor Motor Car Co.	Mercury	Lima, O.	Raxter Brothers	Hudson
Bloomfield, Ia.	H. A. Wishard	Haynes	Louisville, Ky.	Hite D. Bowman	Saxon
Breese, Ill.	Breese Garage	Cole	Los Angeles, Cal.	Sparks Miller Motor Co.	Empire
Britt, Ia.	Castle Auto Co.	Kisselkar	Lafayette, Ind.	Paterson Garage Co.	Haynes
Brantford, N. D.	O. A. Burdick	Haynes	LaCrosse, Wis.	Elsen & Phillips	Cole
Boston, Mass.	Victor Motor Car Co.	Mercury	Lehigh, Pa.	Serfas Motor Car Co.	Cole
Chicago	Peter O. Lind	Oakland	LaGrange, Ky.	Yager Brothers	Hupmobile
Chadron, Neb.	Reckman & Birdsall	Cartercar	Marysville, O.	H. I. Huffman & Son	Oakland
Colon, Neb.	Henning Nelson	Buick	Mt. Sterling, O.	Roy Baxter	Oakland
Casey, Ill.	Partlow & Weaver	Oakland	Medaryville, Ind.	C. W. Holl & Co.	Oakland
Carmi, Ill.	Leathers & Newcomb	Chevrolet	McClellan, Ia.	O. K. Whitson	Empire
Central City, Neb.	Linderman & Blake	Empire	Missouri Valley, Ia.	Mason & Seabury	Buick
Columbus, Neb.	Gottberg Auto Co.	Empire	Mt. Carmel, Ill.	B. H. Kemp	Maxwell
Columbus, Ga.	Gatewood & Woodruff	Maxwell	McAlester, Okla.	John Basalo	Maxwell
Chester, Pa.	J. R. Helms	Maxwell	Mosheim, Tenn.	W. H. Reaves	Maxwell
Carmel, N. Y.	E. Fowler	Maxwell	Marysville, Cal.	Henry Heier	Maxwell
Cotatesville, Pa.	E. S. Thorne	Maxwell	Mineral Point, Wis.	Star Auto Co.	Maxwell
Camden, S. C.	W. R. Eve, Jr.	Hupmobile	Monticello, Ga.	Dr. F. S. Belcher	Hupmobile
Cameron, Tex.	J. H. Gandy	Hupmobile	Mechanicsburg, O.	Stuart & Co.	Hupmobile
Charabaneau, N. D.	Fee & Meyer	Hupmobile	Maskell, Neb.	A. E. Westberg	Hupmobile
Centerville, S. D.	Centerville Hardware Co.	Hupmobile	Merrill, Ia.	C. C. Hauff	Hupmobile
Columbus, O.	Buckeye Cyclecar Co.	Scripps-Booth	Melrose, Mass.	Fred H. Goss	Lyons-Knight
Canton, O.	Canton Motor Car Co.	Chandler	Milwaukee, Wis.	Rayfield Motor Sales Co.	Rayfield
Clinton, Ill.	Hatfield & Riley	Ford	Millstadt, Ill.	August Diedrich	Metz
Cairo, Ill.	F. E. Buder	Reo	Marshall, Mo.	Brown McAmis & Son	Haynes
Chippewa Falls, Wis.	Charles H. Danner	Kisselkar	Mulkeytown, Mo.	E. K. Elkins	Hupmobile
Cisne, Ill.	C. T. Maris	Empire	Milwaukee, Wis.	Brunkhorst's Garage	Haynes
Darlington, Ind.	George Tribbett	Maxwell	Monroe, Wis.	Bear & Jaberg	Haynes
Center Junction, Ia.	M. G. Alsever	Hupmobile	Milford, Ia.	Munson Brothers	Cole
Dublin, Tex.	N. J. Keith	Hupmobile	Monett, Mo.	C. W. Lehnhard	Cole
Defiance, O.	Clint Colwell	Hupmobile	Morgantown, W. Va.	Colonial Motor Car Co.	Cole
DePere, Wis.	Toonen-Barlament-Wright Co.	Ford	Miami, Fla.	A. H. Bouldin	Kisselkar
Charlton, Ia.	McFall Motor Car Co.	Haynes	Neche, N. D.	Eld & McLachlan	Hupmobile
Duluth, Minn.	M. W. Turner	Haynes	North Liberty, Ind.	I. A. Finch	Maxwell
Dallas, Tex.	Sacksteder & Potter	Haynes	New Boston, N. H.	George D. Marden	Maxwell
DeSoto, Mo.	I. B. Maness	Empire	North Clymer, N. Y.	W. H. Newell	Hupmobile
Danville, Ill.	Wm. McFerrer & Co.	Cole	New Milford, N. Y.	S. R. Drew & Son	Hupmobile
Dixon, Neb.	F. J. Hooker	Hupmobile	Nevada, Ia.	J. F. McDonald	Cole
Elko, Nev.	Steel Garage	Maxwell	New Rochelle, N. Y.	G. O. Reynolds	Cole
El Paso, Tex.	W. E. Groendycke	Maxwell	New Orleans, La.	Southern Motor Car Co.	Kisselkar
Ely, Nev.	Earl Mangum	Maxwell	Norfolk, Va.	Kirkman Motor Car Co.	Kisselkar
Equality, Ill.	Wiedemann Brothers	Maxwell	O'Neill, Neb.	Jordan & Warner	Buick
Eatonville, Wash.	C. H. Williams	Ford	Oil City, Pa.	Phinney & Sloan	Franklin
Elyria, O.	Fred X. Kuchenrither	Haynes	Owensville, Mo.	J. H. Carmi	Metz
Eaton, O.	S. J. Brower	Cole	Oshkosh, Wis.	Cole Motor Co.	Cole
Estherville, Ia.	Estherville Garage & Machine Works	Cole	Ottawa, Ont.	Austin G. Cowan	Hupmobile
Everett, Wash.	Hilzinger Motor Co.	Cole	Prairie du Chien, Wis.	Keller & Harris Auto Co.	Maxwell
Fullerton, Neb.	Rhoner & Scott	Buick	Palestine, Tex.	J. D. Woods	Maxwell
Fair Haven, Vt.	Walter I. Smith	Maxwell	Penn Yan, N. Y.	Edward L. Geer	Oakland
Ft. Dodge, Ia.	David MacMullan	Haynes	Philadelphia, Pa.	Penn Auto Sales Co.	Paterson
Flat River, Mo.	Flat River Motor Co.	Empire	Princeton, W. Va.	J. M. Hines	Maxwell
Fostoria, O.	H. J. Adams	Reo	Paoli, Ind.	Arthur Mathews	Maxwell
Fort Wayne, Ind.	H. G. Raymond	Kisselkar	Princeville, Ill.	F. L. Sloan & W. C. Williams	Maxwell
Flora, Ind.	Clingenpeel & Brower	Maxwell	Peekskill, N. Y.	Wm. H. Ash	Maxwell
Fond du Lac, Wis.	Barnes, Zingsheim & Mable Co.	Paterson	Pueblo, Colo.	Western Motor Car & Truck Co.	Maxwell
French Camps, Miss.	J. W. Howell	Hupmobile	Poultney, Vt.	Poultney Auto & Machine Co.	Maxwell
Florence, Wis.	Henry R. Seidel	Hupmobile	Oconto, Wis.	Peter De Cloux	Maxwell
Franklin, Pa.	Myers Carriage Co.	Maxwell	Plankington, S. D.	Frank Bohe	Hupmobile
Florence, S. C.	C. R. Smith	Hupmobile	Ponca, Neb.	A. H. Hilles	Hupmobile
Grand Island, Neb.	R. S. Fry	Empire	Peekskill, N. Y.	W. H. Ash	Hupmobile
Greenfield, Ia.	F. P. Huston	Metz	Philadelphia, Pa.	William Willis	Metz
Giltner, Neb.	Charles S. Browne	Maxwell	Port Washington, Wis.	Erler & Aggen	Buick
Geddes, S. D.	W. H. Fowler	Hupmobile	Piqua, O.	R. E. Jackson	Haynes
Granville, Ia.	John List	Hupmobile	Peekskill, N. Y.	Eagle Garage	Cole
Grand Forks, N.D.	Monley & Smith	Haynes	Pensacola, Fla.	N. Goldring	Cole
Greenwich, Conn.	Bullard Garage	Cole	Piedmont, W. Va.	Wm. T. Sizler	Cole
Green Bay, Wis.	West Side Garage	Kisselkar	Peoria, Ill.	Voss Brothers	Saxon
Grand Forks, N. D.	Sims Auto Co.	Kisselkar	Park River, N. D.	David E. Kinsala	Kisselkar
Harper, W. Va.	H. H. Harper	Oakland	Philadelphia, Pa.	Gibbons-Wetherill Service Co.	Kisselkar
Hardwick, Vt.	W. E. Gaither	Oakland	Pittsburg, Kan.	Pittsburg Automobile Co.	Cole
Howell, Ind.	Howell Auto & Repair Co.	Maxwell	Republican City, Neb.	John J. Runk	Maxwell
Howard, S. D.	S. T. Radcliff	Maxwell	Ravenswood, W. Va.	E. E. McKinley	Maxwell
Hooper, Neb.	Tunberg & Retz	Buick	Reading, Pa.	Wm. D. Degler & Co.	Maxwell
Hecla, S. D.	A. G. Street	Hupmobile	Remsen, Ia.	Elchhorn & Willenburg	Hupmobile
Hartley, Ia.	J. C. Bradstreet	Hupmobile	Reading, Pa.	James M. Kalbach Co.	Franklin
Hillsboro, Tex.	T. L. Newton	Hupmobile	Rayne, La.	Stamm-Scheele Mfg. Co.	Haynes
Hamersville, O.	H. H. Hannah	Hupmobile	Schuyler, Neb.	Douglas Groteschen	Empire
Hope, Minn.	Slezak Brothers	Hupmobile	Silver City, Neb.	C. W. Sawyer	Metz
Harrisburg, Ia.	T. C. Dempewolf	Hupmobile	Silver Creek, Neb.	W. J. O'Callahan	Henderson
Huntington Park, Cal.	A. P. Hultquist	Hupmobile	Salem, N. J.	New Jersey Motor Co.	Maxwell
Hillsboro, O.	Brent Woodmansee	Overland	Scioto, O.	M. M. Webster	Maxwell
Harrisonburg, Va.	Hammen & Yancey	Haynes	Shennandoah, Ia.	C. A. Piper	Hupmobile
Hamburg, Ill.	A. F. Buchanan	Reo	Santa Rosa, N. M.	A. J. Nusome & M. G. Nuckles	Hupmobile
Harrisburg, Pa.	Bowman Co.	Cole	Sikeston, Mo.	Lancaster, Keller & Co.	Hupmobile
Hastings-on-Hudson, N. Y.	Hastings Garage	Cole	Sutherland, Ia.	Earl Yonde	Hupmobile
Indianapolis, Ind.	Frank P. O'Brien	Pierce-Arrow	Storm Lake, Ia.	Ray C. Point	Hupmobile
Iron River, Mich.	Thorn & Singler	Hupmobile	Seattle, Wash.	Aldrich Cyclecar Co.	Dayton
Kalispell, Mont.	Coleman & Shacklett	Maxwell	Shelton, Wash.	W. A. Johnson	Ford
Kingsley, Ia.	Tom Sheaffer	Hupmobile	Spokane, Wash.	Western Motor Co.	Richmond
Kankakee, Ill.	D. L. Hogan	Haynes	Shreveport, Pa.	Shreveport Auto Sales Co.	Franklin
Kankakee, Ill.	N. H. Odhe	Cole	Seattle, Wash.	N. J. Morhouse	Haynes
Kewanee, Ill.	Kewanee Garage	Cole	St. Louis, Mo.	DeLuxe Automobile Co.	Metz
Kasson, Minn.	A. T. Beaver	Maxwell	St. Louis, Mo.	Compton Heights Garage	Grant
			St. Louis, Mo.	Lindell Auto Sales Co.	Herff-Brooks





# From the Four Winds



**CONTEST Germ Bites Hartford**—There is a movement on foot in Hartford to revive interest in motoring contests. Hartford has had nothing of the sort for some time past. A go-as-you-please run from Hartford to New York or Boston and return has been suggested and there is possibility of a track meet at Charter Oak park, possibly on Memorial day. A stock car contest also is proposed.

**Motor Road Through Solid Rock**—One of the most spectacular bits of work for motor roads has just been completed on the interstate highway between Spokane, Wash., and the Glacier National Park. For 3 miles the road passes through solid rock through which it was blasted. The road bed, which will be open for traffic this summer, runs about 400 feet above the Kootenai falls and canyon. There yet remains a small stretch of heavy work between Libby, Mont., and the falls, but motorists will be able to pass over the entire road by September 1.

**Conducting Unique Membership Contest**—One of the most unique campaigns of its kind is now being conducted by the San Antonio Automobile Club. The object of the contest is to secure new members, and these members are being obtained by means of teams, each team being named after the cars which the team members drive. A team consists of five club members, each driving the same make of car. There are eighteen different teams entered in the contest, and the team which secures the largest number of points through entering new members wins the contest and the prize.

**Ohio A. A. to Meet March 28**—The annual meeting of the Ohio Automobile Association will be held at Youngstown, O., March 28. Delegates from all of the local motor clubs in the Buckeye state will be in attendance. A number of important matters will be discussed, chief among which will be the recommendations to be made at the next session of the Ohio legislature as to a new state motor law. It is generally conceded that a new law will be drafted and the motoring associations of the state will be asked for their advice and help. The Cincinnati deflection from the state organization will also receive attention.

**Erecting "Common Sense" Signs**—South Wheatland township in Macon county, Ill., has installed something new in sign boards. At each cross roads a cast iron sign will be placed upon a high post, showing the public roads and section lines, together with the locations of all villages and cities and the distance to each. These signs are 2 feet square and can be read easily by passing motorists. A star shows the exact intersection at which the sign is placed. With these sign posts in every township, it will be possible for the driver to go to any point without asking questions or depending upon a map or other source of information.

**New Argument Against Concrete Roads**—Opponents of highway improvement, and those particularly opposed to big expenditures for concrete roads in Wisconsin, have found a new argument against concrete road construction. They claim farmers are up in arms because they are being subjected to heavy expense for horseshoeing, due to the abnormal wear on horseshoes from travel over the hard concrete highway surfaces. They are said to be longing for the old days when roads were quagmires in wet weather and layers of dust in dry weather, yet horse-

shoes lasted much longer than they do now. The "village smithy," however, is in high glee because of the rush of business, and particularly so because they were ready to close up shop only a few months or years ago because the motor car was making horses extinct. There is little chance, however, that Wisconsin will stop building concrete roads on the horseshoe argument set forth by the obstructionists.

**Mexicans Raise Car Duties**—The constitutionalists of Mexico who hold the entrance port of Naco, Ariz., have ordered that a duty of \$600 Mexican money be imposed on all motor cars going from the United States into the state of Sonora through this port. The duty is forcing parties bound for Cananea and other parts of Sonora to change cars at the border instead of going on across the line and paying the tax.

**Dealers to Act as Speed Cops**—Thirty-two members of the Motor Car Dealers' Association of Los Angeles will be appointed special policemen to deal with violations of the speed ordinance. These deputies are to serve without pay and will pledge themselves to take the time to go into court and prosecute a driver whenever an arrest is made. The plan originated with Captain H. D. Ryus, president of the association. The members selected will act in pairs, one watching the speedometer and the other driving in pursuit of the speeder.

**Plan Extensive Road Improvements**—Seven hundred miles of the Twin Cities-Aberdeen-Yellowstone Park trail are to be graded in 1914 and 300 are to be graveled. A bridge is to be built across the Little Missouri river at Marmouth, S. D. Fourteen counties estimate that \$81,126 will be spent on the trail, which is to be completed before the end of 1915. In 1912-1913 twenty-two counties, reporting for 1,050 out of 1,150 total miles, gave a total expenditure of \$494,621. In all 1,038 miles of the trail were located, 646 miles were graded and 118 miles were graveled.

**To Appoint Road Commission**—At the request of about twenty good roads' boosters, members of various motor and other organizations throughout the state, Governor Samuel M. Ralston has promised to appoint a commission to make a study of the road laws of Indiana and recommend to the next general assembly such legislation as is found to be desirable. The commission is to consist of from ten to fifteen members, who will serve without pay. The organizations interested in the movement are the Indiana Good Roads Association, Indiana Conference of County Road Superintendents, county commissioners and county surveyors, the Indiana Engineering Society, the Hoosier Motor Club and the civil engineers' department of Purdue University.

**Experiment with Granite Road**—Milwaukee county, Wis., may experiment with granite for permanent highway improvement this year. In the consideration of the reconstruction of the famous Whitefish Bay road along Lake Michigan north from Milwaukee, the county board has received a proposition from a large granite quarrying concern of Wisconsin to supply crushed granite at a price only 8 per cent higher than that paid for common gravel. Granite roads, which have been found successful in western states, are claimed to last two and three times as long as gravel macadam and rank with concrete for durability. Inasmuch as a 40-foot roadway is proposed for Whitefish Bay, the

opinion leans toward granite rather than concrete, but the board will ask for bids on concrete, two-coat reinforced concrete, asphalt, tar macadam and granite to determine economy as well as efficiency. The board has just awarded contracts for the construction of approximately 14 miles of concrete highway at an aggregate cost of \$180,000, or \$12,857 per mile. The 1914 lettings for concrete work are considerably lower than for the last 2 years, and in fact the recent letting of \$180,000 worth of work is \$20,000 below the county highway engineer's estimates, which were \$200,000.

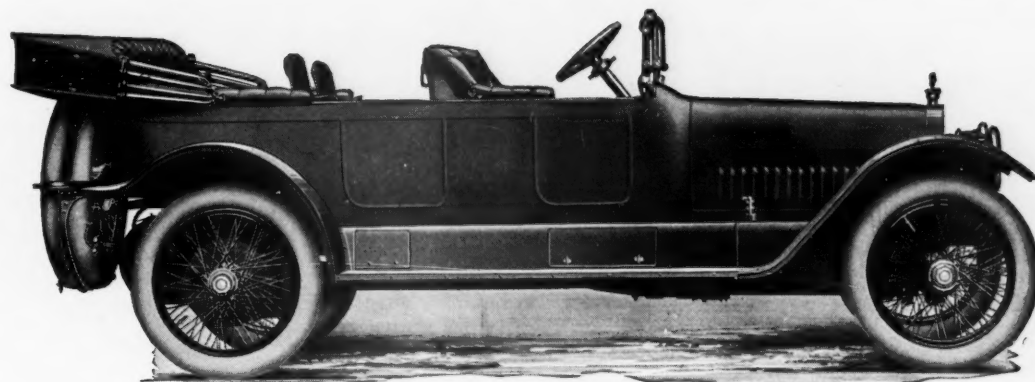
**Milwaukee Forms Safety Commission**—The Public Safety Commission of Milwaukee, organized recently by 100 representative business and professional men to promote a strong safety first movement in Milwaukee, has been incorporated without capital stock. Committees have been appointed and are starting active work. The membership is limited to 100 members. Chief of Police John T. Janssen has been appointed chairman of the committee on street traffic. Gen. Otto H. Falk, a leading member of the Milwaukee Automobile Club, is president of the commission.

**Ohio License Fees Total \$457,537**—According to a complete report recently issued by J. A. Sherer, registrar of motor cars in Ohio, the total receipts of the department for the year 1913 amounted to \$457,537.55 and the net receipts were \$395,063.23. During the year 80,664 gasoline and steam licenses were issued and 4,126 electric licenses. There were 10,052 chauffeurs registered, bringing in \$20,104 in fees. There were 1,054 duplicate number plates secured, for which fees of \$1,054 were charged, and 99 duplicate badges to chauffeurs were issued. There were 1,366 manufacturers and dealers registered, for which fees amounting to \$143,660 were secured.

**Motor Trucks to the Rescue**—When the steam and electric roads were temporarily unable to make scheduled time during the recent storms in southern California, the motor truck saved the day. The feats performed by the motor truck and motor car were many. Mails were carried, passengers hauled, freight transported and perishable goods delivered. At one time during the washouts a carload of fresh meats and 30 tons of groceries were loaded onto a train with five large trucks. A supply station was established at Rivera, where the trucks were taken off the train and sent out to Long Beach and Whittier, Cal., with supplies from Los Angeles.

**Texas Pony Has Dangerous Rival**—There are 54,368 motor cars in Texas, having a total value of \$62,085,256, according to information gathered by the Dallas Chamber of Commerce. On a per capita basis Texas now has one car to every 73 people. According to statistics compiled by the Texas Business Men's Association in 1912, there were 35,187 cars in the state, representing an investment of \$43,983,750. In 1911 there were 29,983 cars in Texas. Dallas county leads in the number of cars, with 6,052. The other leading counties in number of cars are: Bexar, 4,226; Harris, 4,224; Tarrant, 3,919; McLennan, 2,235; El Paso, 1,806; Travis, 1,450; Jefferson, 1,436; Ellis, 1,164; Williamson, 1,088. There are no statistics available showing the percentage of gasoline and electric cars or the number of trucks. The Texas pony regards these statistics with awe.

## Stearns-Knight Efficiency is All-the-Year-'Round Efficiency



Stearns-Knight Six-Cylinder Seven-Passenger Touring Car  
(Wire Wheels Extra)

**E**VERY Stearns-Knight car is an all-the-year-'round car, no matter which of the many Stearns-Knight body types it may carry. Efficiency, flexibility, power and durability are inbuilt characteristics of the Stearns-Knight chassis. From the silent Stearns-Knight motor to the sturdy Stearns rear axle every part is as good for the long, strong pull or the sudden emergency as for the requirements of every-day service.

Eighteen Models—\$3750 to \$6200

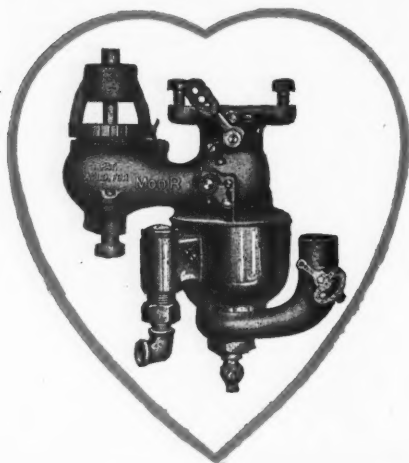
Four and Six Cylinders

**THE F. B. STEARNS COMPANY**

CLEVELAND, OHIO



# 1,500,000 SCHEBLER

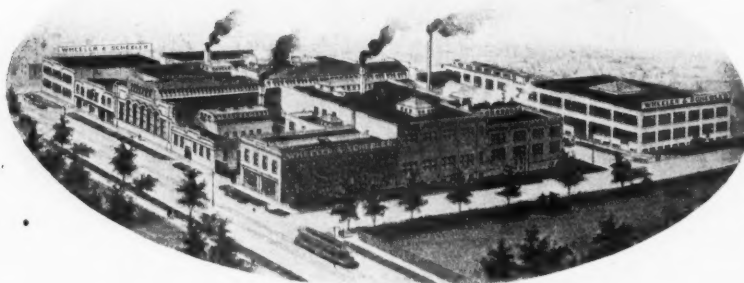


## Carburetors In Use!

When a motor mechanic sees a Schebler on a motor he welcomes it as an old friend.

Do you want service and satisfaction? We give service—our instruments satisfaction.

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**The  
Schebler  
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## WHEELER & SCHEBLER, Indianapolis, Ind.

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# The Klaxon Trade-mark

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is an  
asset  
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☛ To display the Klaxon trade-mark identifies you with a product universally recognized as the best of its kind made. ☛ To be known as a Klaxon dealer adds to your standing. ☛ The jeweler who sells Gorham silver proclaims the fact whenever possible—on his stationary, in his store, on his windows. So do the agents for Knox or Dunlap hats, for Spalding baseballs, for Arrow collars. ☛ Among motorists the Klaxon is as well known as any of these. ☛ There is no other signal with anything like the Klaxon's reputation. ☛ It is easy for you to capitalize on this fact and profit by it.

☛ Write for further particulars.

Address "Klaxon Dealer  
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Economy Auto Supply Co.

KLAXON  
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Show window of the Economy Auto Supply Company, Newark, N. J.



# National

## Six—\$2375



### "Looks" Do Count in Selling Automobiles

There is an age worn platitude that looks don't count. But the truth of this can only be comparative. A plow may be just as useful if it is ugly, and a man may be a winner even if he is not handsome, but every dealer knows that good looks are absolutely essential in motor cars. Suppose you have two cars of equal quality, now if one of these is far better looking than the other, you know the beautiful car will outsell the other.

#### National Quality Acknowledged

Every one admires the National car when it comes to real service. "Runs well—wears well and long—holds up and is always sure and capable." Fourteen years of manufacturing experience is behind the National. Think of the years of success of this winning line of cars, how it still holds world's contest records and how National owners come back to us when they want new cars. There is no informed person who does not admit the National's quality.

#### Looks That Add Comfort

In "looks" we don't believe there is a single car on the market today that is more striking and appealing than the National. The long low stream line design; the charming finish; the smart slope from cowl to radiator; the clear running boards; the general

air of refinement and perfection in every little detail. And these beautiful effects actually add comfort and convenience to the passengers. Add to the other good qualities the special National cantilever springs and you have unusual riding comfort.

#### National Dealers are Prosperous

Line up your competitors' cars in a row, let a prospect then stand before the entire array of machines and see how quickly he will select the National. Why? Even without going further than the appeal of the eye, the prospect is won over to the National. This is the dealer's first "trick." Then when your prospect begins to learn of the real honest value, the wonderful stamina and sureness of the car's actual makeup, then it is that you "trump" your competitors. Remember car owners want to deal with a concern with a good reputation. There is none better than—

**The National Motor Vehicle Co.**  
Indianapolis, Indiana

**"You Don't Have to Raise the Hood"**

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They  
Are All  
Beating  
the Big  
Base  
Drum



## Storage Battery

is the Leader and the drummers all want the job.

But a big noise does not produce harmony, and harmony is a quality necessary to everything that is good.

The absolute harmony of elements required in a satisfactory storage battery has never been so carefully worked out or brought to such a state of perfection as is found in the **ELBA**.

That's why **ELBA** Storage Batteries are used as standard equipment by over 100 manufacturers of automobiles on which Electric Starting and Lighting Systems are installed.

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protect **ELBA** users and are positive insurance of long life and satisfactory, uninterrupted storage battery usefulness.

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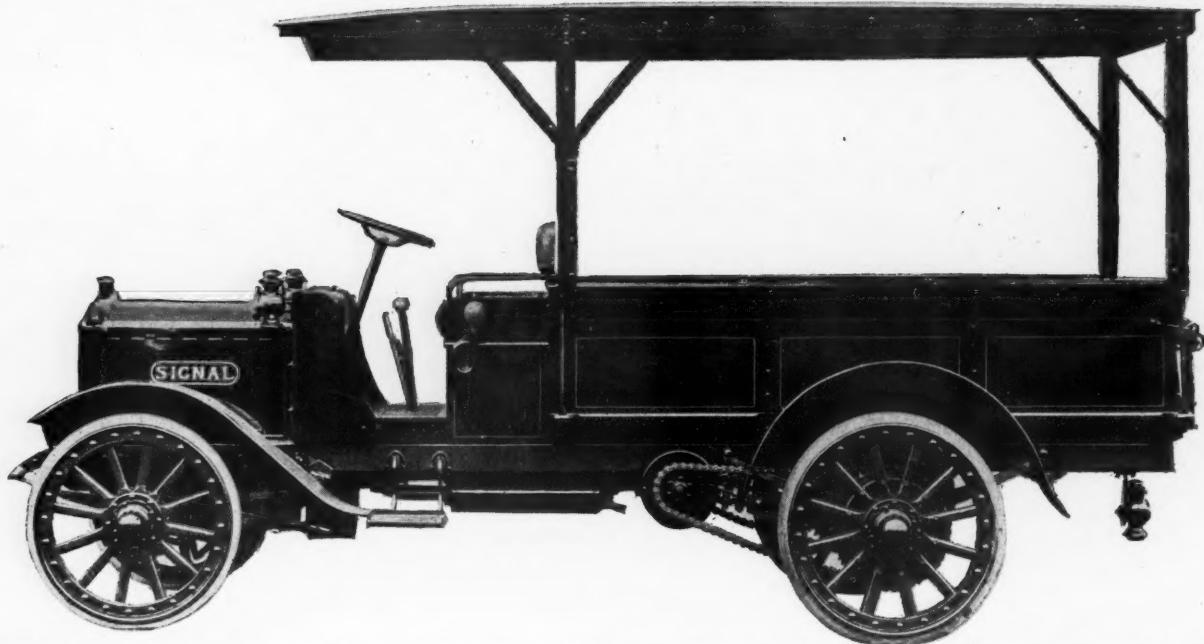
SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO

(92)



# 1500 POUND **SIGNAL** MOTOR TRUCKS

## "GUARANTEED ON SOLID TIRES"



### \$1400

*Chassis with Driver's  
Seat and Full  
Equipment*

Continental Motor  
Eisemann Magneto  
Stromberg Carburetor

Signal Truck with Open Express Body  
and Canopy Top

### These Specifications Will Interest You

Timken Axles  
Gemmer Steering Gear  
Hartford Clutch

### \$1400

*Chassis with Driver's  
Seat and Full  
Equipment*

Covert Transmission  
Russel Jack Shaft  
Hyatt Bearings

## DEALERS

There is quite a number of trucks on the market, using more or less standard parts, and giving more or less satisfaction in service. But the Signal is the only 1500 pound job that embodies all these standard units—Timken Axles and Bearings—Continental Truck Motor—Eisemann Magneto—Covert Transmission and many others that are pre-eminent for their service-giving qualities.

In addition to being the standard in its field, each unit is properly co-ordinated with the others—forming a perfectly balanced and highly efficient truck.

Just think of the selling leverage the use of these well known and standard units gives you in your territory, as they insure a maximum service at minimum expense to your customers.

By taking on the Signal, you round out your line and increase your sales efficiency.

**Signal Motor Truck Company**  
Detroit, U. S. A.



## 99% of all the Cars at the Importers' Show carried the Famous Warner Auto-Meter

**T**HE tenth annual Importers' Automobile Salon opened in the grand ball room of the Hotel Astor, New York City, January 2.

Seven nations were represented by a few less than one hundred complete motor cars, the estimated total value of which was about one million dollars. Ultra luxuriousness was the keynote of the exhibition. In some cases the lavishly fitted bodies and appointments brought the price of a single complete car up to \$20,000.

Of these magnificent cars, the costliest in the world, built and furnished expressly for the wealthiest, most exclusive and most particular

people, only one was equipped with the obsolete centrifugal type speedometer. Every other car carried the famous Warner.

The famous Magnetic Type Speedometer dominated in the proportion of nearly 99 to 1. This shows, more clearly than ever before, that people who can afford anything they want, demand that the speedometers on their cars shall be of the *magnetic type*. This shows that the makers who cater to those people are taking good care to heed and supply this demand for the Warner Auto-Meter.

You can have a magnetic type Warner Auto-Meter on any car you buy—if you ask for it.

### Stewart-Warner Speedometer Corporation

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*And Service Stations in all cities and large towns*

# WARNER AUTO-METER

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AND WATCH THE  
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# Here it is

## ZIP → Cyclecar

The increasing demand for economy in motor vehicle transportation means just one thing, Mr. Dealer—it means practical cyclecars, and practical cyclecars mean another opportunity for dealers who can see the handwriting on the wall just as big as the opportunity for the dealers who were first to get into the automobile field.

If you are a live dealer we don't have to tell you that thousands of people are waiting to own a practical cyclecar. If you doubt it turn to the newspapers and magazines and read the columns of cyclecar articles, all bearing evidence of a waiting public demand for this new vehicle.

Here, Mr. Dealer, is another opportunity so big that we don't even dare measure its possibilities for you, and the possibilities, as in all fields, are biggest for dealers who first identify themselves with the industry. Line up with the first practical cyclecar—the cheapest-to-buy-and-to-maintain, 2 passenger motor vehicle ever built, yet satisfying the public in the matter of comfort and dignity.

### That's the ZIP

*The Zip runs 35 to 45 miles on a gallon of gasoline—1,000 miles on a gallon of lubricating oil—8,000 to 10,000 miles on a set of tires costing less than \$40—at a speed of 40 miles an hour—affords a degree of safety at the highest speeds (on account of its low construction) that no other class of motor vehicle offers—goes through the worst kind of roads—and rides as easily as only the very heaviest automobiles equipped with the finest shock absorbers.*

In fact, the Zip is the perfect, practical cyclecar. Its record of road performance and the tests under which it has stood up are our proof. It travelled 200 miles further on a long distance test than any other cyclecar today has done—has crossed plowed fields—climbed hills that would stall many a big car and come through eager for more.

But a perfect cyclecar isn't all.

*You, Mr. Dealer, want a perfect cyclecar manufactured by a reliable and conservative organization. The company manufacturing the Zip is as strong as its product. They are conservative, too—and that is another big feature. If they weren't the Zip would have been placed upon the market and offered the public and you dealers a year ago.*

But practically all of the past year was devoted to experimenting—we built experimental cars—tested them—gave them every conceivable abuse over all kinds of road conditions—took them apart after every few days' gruelling tests, made changes where necessary, and the car we now offer answers every demand that has ever been put upon it. That is why we can afford to stand back of it with our reputation and guarantee.

Our idea was not to see how cheaply we could build an automobile but how good we could make a cyclecar. That's why we worked over our product, tested it day after day, week after week and month after month before we were willing to stake our reputation on it. We are manufacturing and making deliveries right now—every day, and want to get in touch with you if you are the live dealer in your city.

Look at the illustration on the opposite page; read the specifications. The car itself is even better than either the illustration or specifications give evidence of.

Get in line with this new, big industry that is here. Represent a cyclecar that will be the biggest selling cyclecar in the country—the ZIP, \$395.

Write today for our dealer's proposition; or, better still, take the train to Davenport—look over our product, our factory, and get acquainted with the manufacturers as well as the product.

**Zip Cyclecar Company, 821 Warren St., Davenport, Iowa**

# THE ZIP CYCLECAR

## \$395



### COMPLETE SPECIFICATIONS

**Motor:** "V" type motor, 45 degree, air-cooled; 2 cylinders,  $3\frac{1}{2} \times 3\frac{29}{32}$ . Overhead valves. Sparks-

Withington fan, 14" dia., 6 blades, steel rimmed, driven with 1" flat leather belt. Crankshaft on ball and roller bearings. Oiling system combination positive force-feed and splash automatically controlled under all speeds by 4-speed oiler. Ignition by Atwater-Kent system. Carburetor, Schebler, mounted between cylinders on short intake pipe; warms mixture before entering cylinders.

**Transmission:** Friction type transmission; any number of speeds forward and reverse. Transmission control without notches permits greater choice of speeds without the possibility of wearing grooves or ruts in the transmission disc. Disc, special gray iron, 12" in dia., mounted on New Departure ball bearings. Disc floats free on its shaft through the thrust sleeve, eliminating unnecessary wear at this point. The driving thrust of the disc as well as

the load of the disc is carried by the ball bearing. The latter is self-lubricating packed in grease in a dust-proof case. Propeller-shaft, hollow seamless steel tubing,  $1\frac{1}{2}$ " outside dia.,  $1\frac{1}{8}$ " wall. Pressure to friction disc is applied by leverage. Spur wheel, which takes the friction from the disc, is 12" dia. with a hard fibre filler face  $1\frac{1}{4}$ ", with beveled edges to compensate for wear. Spur wheel is mounted on  $1\frac{1}{8}$ " steel shaft of 30-40 point carbon. Shaft is mounted on New Departure ball bearings on each side of the frame. These ball bearings enclosed in dust-proof, oil-tight cases. The pulley wheels on the end of jack-shaft are adjustable to different gear ratios ranging from 3:1 to 6:1 by simply moving washers. The drive belt from jack-shaft to rear wheels,  $1\frac{1}{2}$ " duck wall, non-stretchable. The Zip friction transmission is the simplest—only 20 parts.

**Frame:** The frame is channel section pressed steel,  $2\frac{1}{2}$ " deep with angles  $1\frac{1}{4}$ " wide. Four cross mem-

bers reinforced with ten gussets give the frame tremendous strength and safety. **Springs:** Full elliptic type both front and rear; 30" long. Spring action, 8" in front, 5" in rear. Full elliptics are the most resilient, easiest riding springs known for road vehicles, especially where vehicles are of light weight. Zip cyclecar springs are guaranteed against breakage at any time during the life of the car.

**Axles:** The front and rear axles of I-beam section drop forgings. Steering knuckles on front axles forged in one piece, mounted on case-hardened pins having a bearing on case-hardened washers. Tie rods and drag links are adjustable. Both axles equipped with grease cups at all bearing points. Wheels, special make wire wheels with extra wide hubs and extra weight spokes.

**Tires:** 28" x  $2\frac{1}{2}$ ".

**Brakes:** Expanding brakes operating on inside drum on rear wheels. Brake bands 6" in dia.,  $1\frac{1}{8}$ " face. Emergency brake operating on transmission reverse. The Zip cyclecar has the greatest braking surface per hundred pound weight of any car. The driving rims on the rear wheels extra heavy to carry the weight of the car in case of accident or on specially rutty roads. The driving rims are  $17\frac{1}{2}$ " in dia.

**Steering Wheel:** Rack and pinion type steering gear operating in case packed in grease. Case is dust-proof. Throttle and spark control mounted below steering wheel on opposite sides. Steering wheel 14" in dia., mounted on 3-arm spider. Steering post stiffened by bracket attached to cowl board.

**Body:** Roadster body, fore-door type, seats side by side. Seat 37" wide, 16" deep, back of seat 17" high. Distance from dash to back of seat 52", giving more leg-room than some big cars. Body painted Brewster green. Drive, left-hand. Control pedal standard electric type with ratchet on one-piece mounting. Running boards with standard automobile fenders and aprons all joined together on both sides. Gasoline tank in dash under cowl. Capacity, 4 gals., sufficient for 160 miles. Luggage compartment behind the rear seat.

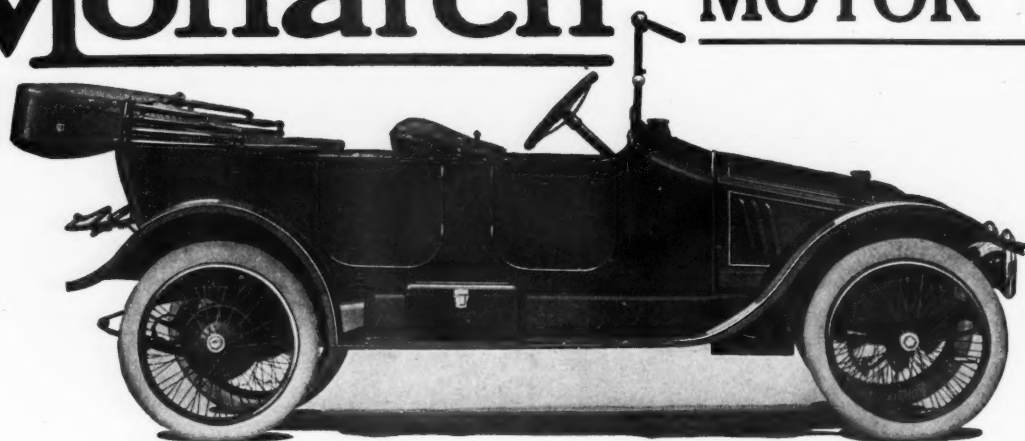
**Equipment:** 6-volt, 40-ampere hour storage battery. Special electric headlights and tail lights. Electric horn mounted under the hood.

# LOOK AT IT



# Announcing a Light "SIX" at \$1250

## Monarch MOTOR CARS



Five Passenger Touring Cars  
Electric Self-Starter, Electric Generator and Wire Wheels

### FOURS

**\$1000**

110" WHEELBASE  
G. B. & S., 3 $\frac{3}{4}$ " x 4 $\frac{1}{4}$ "  
4 CYL. MOTOR, 28 H. P.

### SIXES

**\$1250**

118" WHEELBASE  
CONTINENTAL, 3 $\frac{3}{8}$ " x 5"  
6 CYL., 35 H. P.

### Comfort

Wire Wheels and Full Elliptic Rear Springs produce the utmost comfort for the passengers, and the least wear and tear on the car

EASILY OPERATED BY FEMININE MEMBERS OF THE FAMILY

### Beauty

Latest success by a famous designer, setting a mark which we believe will stand for years

**DEALERS!—** Here's the line YOU know is right and the one that will create the DEMAND instantaneously

**Monarch Motor Car Company, R. C. HUPP President Detroit, Michigan, U. S. A.**

*When Writing to Advertisers, Please Mention Motor Age.*

# Are your profits leaking away in "Free Service"?

Do you want a substantial net profit in your pocket at the end of the year? Or are you satisfied to give away your profits in "free service"?

Do you want satisfied customers — the best advertisement of your business? Or do you enjoy constant "kicking," dissatisfaction and free repairs?



## Prest-O-Lite

—is the solution of the problem.

Its reliability—freedom from trouble and repairs—make it the one lighting system for the experienced motorist.

Eighty per cent of the public is buying gas-lighted cars.

Next year it will probably be ninety per cent.

### Profit

The Prest-O-Lited car does not come back for free repairs to the lighting system.

But it does come back for exchange service—a constant source of income for you and yet the most economical light for your customers.

You owe it to yourself to take an agency for one of the lower-priced, simple, gas-lighted cars no matter what other cars you are trying to sell.

An agency for such a car, plus your Prest-O-Lite agency, means sales, satisfied customers—PROFITS.

***The sale of 6 gas-lighted cars will pay you more NET profit than the sale of 12 electric-lighted cars***

**The Prest-O-Lite Co., Inc.**

**233 Speedway Indianapolis, Ind.**

(Contributor to Lincoln Highway)

**Exchange Agencies Everywhere**

### Loss

When you sell an electric-lighted car, you are gambling a large part or all of the profit, on the dependability of the electric system. As a general rule, **you lose.**

Such cars are constantly coming back for repairs on the lighting system.

You can't charge what the repairs are worth. Sometimes you make them **free.** Either way, you lose.

THE PREST-O-LITE CO., Inc.,  
233 Speedway, Indianapolis, Ind.

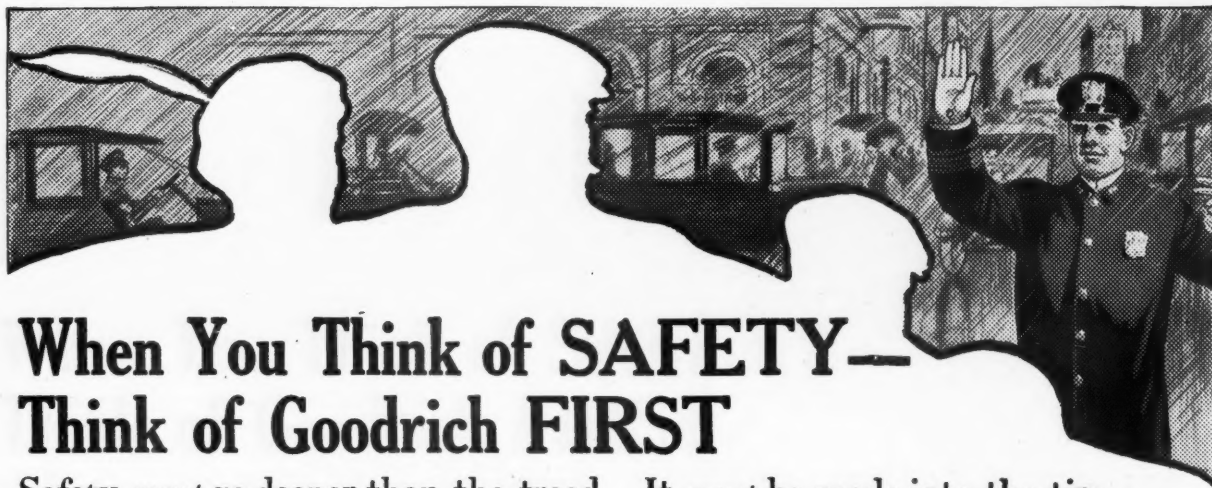
Please send information on ALL Lighting Systems to

.....

.....

.....





## When You Think of SAFETY— Think of Goodrich FIRST

Safety *must* go deeper than the tread. It *must* be made into the tire.

Goodrich Safety Treads are built on a foundation of safety and quality.

The strong rubber fingers clean and grip the road. They stop the skid before it starts. More than that—they help you start and stop and twist and turn and stop. Don't experiment any more. Save your nerves and save your money by using

## Goodrich <sup>Safety</sup> <sub>Tread</sub> Tires

*Best in the long Run*

Don't pay more than the prices  
named here for the accepted  
standard non-skid tires:

Size	Smooth Tread Prices	Safety Tread Prices
30 x 3	\$11.70	\$12.65
30 x 3½	15.75	17.00
32 x 3½	16.75	18.10
33 x 4	23.55	25.25
34 x 4	24.35	26.05
34 x 4½	33.00	35.00
35 x 4½	34.00	36.05
36 x 4½	35.00	37.10
37 x 5	41.95	44.45
38 x 5½	54.00	57.30

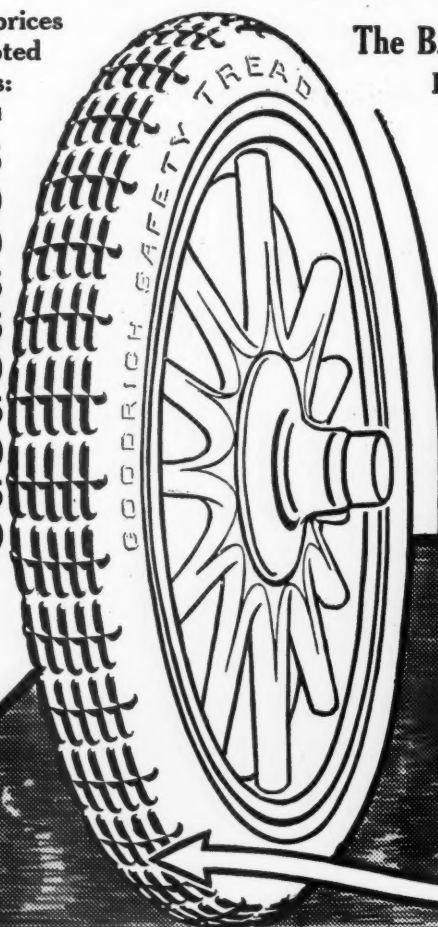
*There is nothing in Goodrich  
Advertising that isn't in  
Goodrich Goods*



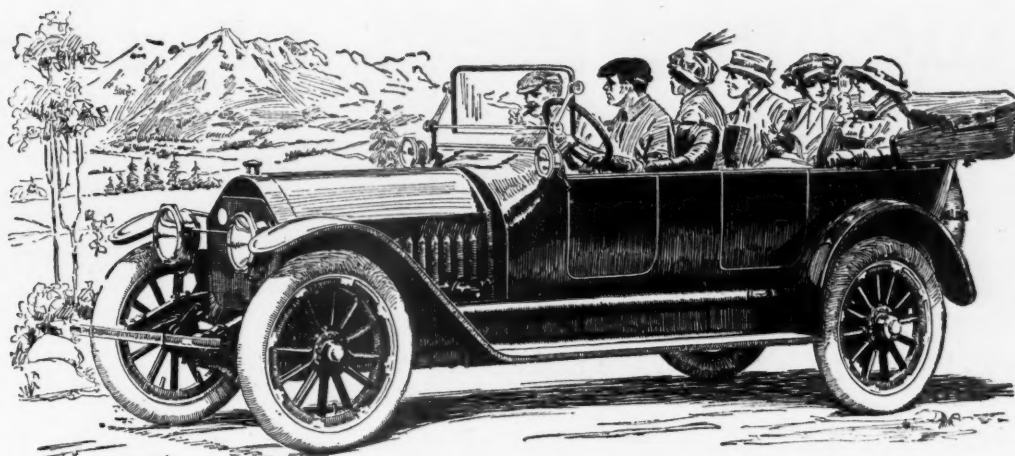
The B. F. Goodrich Company

Factories: Akron, O.

Branches in All  
Principal Cities



The Tread  
that makes  
the Brake  
effective



## —the call of the road

With the advent of spring comes the irresistible **call of the road**—then the inevitable spring rush for automobiles.

Do not let your haste prevent you from going into the car question thoroughly—it's an important purchase and requires the exercise of your best judgment.

You will be acting unwisely if you commit yourself to any car before you have seen this year's KisselKar models—the best values on the market.

If you fancy a moderate priced "Four" that outstrips any "Four" on the market in style, riding quality and engine-supremacy, the KisselKar "40" at \$1850 is your car.

If it is a light "Six" you have in mind, the limit of smooth, quiet action, of refinement, convenience and completeness it is the KisselKar "48" at \$2350.

If it is a big "Six" that can hold its own with any car at any price, under any conditions, the KisselKar "60" at \$3150 should be your choice.

**TO DEALERS:** Before you make a connection, get the KisselKar proposition—it has new and attractive features.

*KisselKar Trucks—six sizes—1500 lbs., 1, 1½, 2½, 3½ and 6 tons capacity. Ask for truck portfolio.*

**Kissel Motor Car Co. 121 Kissel Ave., Hartford, Wis.**

Boston, New York, Chicago, Milwaukee, Kansas City, Minneapolis, St. Paul, Dallas, San Francisco, Los Angeles, Oakland, Philadelphia, Detroit, Houston, El Paso, New Orleans, Washington, Baltimore, Nashville, Duluth, Buffalo, Pittsburgh, Hartford, Conn.; New Haven, Albany, Troy, Rochester, Providence, St. Louis, Marshalltown, Iowa; Omaha, Hastings, Neb.; Madison, Montreal, Quebec, Toronto, Winnipeg, Calgary and 300 other principal points throughout America.

# KISSELKAR



# Is the Judgment of These Makers Sound? ➡

## They all equip with Jiffy Curtains

Either as Standard or Optional Equipment

When so large a proportion of the makers agree on a certain article of equipment, little more need be said regarding its value.

One of them might be mistaken—perhaps two—but thirty-two (this is the total number of makers in this country equipping with Jiffy curtains)—never!

Can you name one other accessory or article of equipment that is used by so large a proportion of America's best car builders?

Jiffy curtains have done a great deal for the whole automobile industry. They have increased the pleasure and convenience of motoring. They make a cozy, comfortable limousine or coupe out of an open body at a moment's notice. They are helping mightily in changing the automobile business from a seasonable to an all-the-year-round proposition.

Buyers are demanding them on their cars. It is conservative to say that three out of every four prospective buyers, this year, will ask the question, "Is this car 'Jiffy-quipt'?" It is going to be hard for a dealer handling a car without the Jiffy equipment to answer it satisfactorily.

Their operation is simplicity itself. They slide back and forth on a flexible black japanned cable concealed in the top, folding up like an accordion. When not in use they are swung up overhead, out of sight, out of the way. One motion of the hand like opening or closing a folding door and the way is clear for entrance or egress. Compare this with the contortions necessary with ordinary curtains. They will last the lifetime of the car because the celluloid panels are never folded or bent, so they can't crack. A novice can raise or lower a complete set in sixty seconds and without leaving the car.

Top makers all over the country are building up a fine business equipping old cars with Jiffy curtains. This is a simple job and not expensive.

You Will Want Further Information. Address

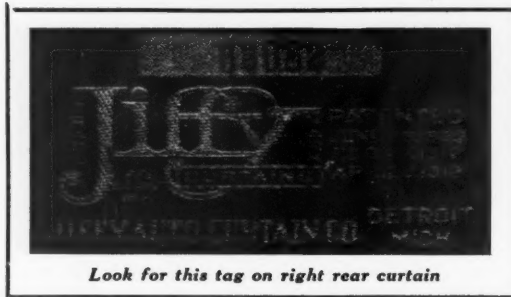
**Jiffy Auto Curtain Company**  
DETROIT, MICH.

*Lights with either square, round or oval ends may be used.*

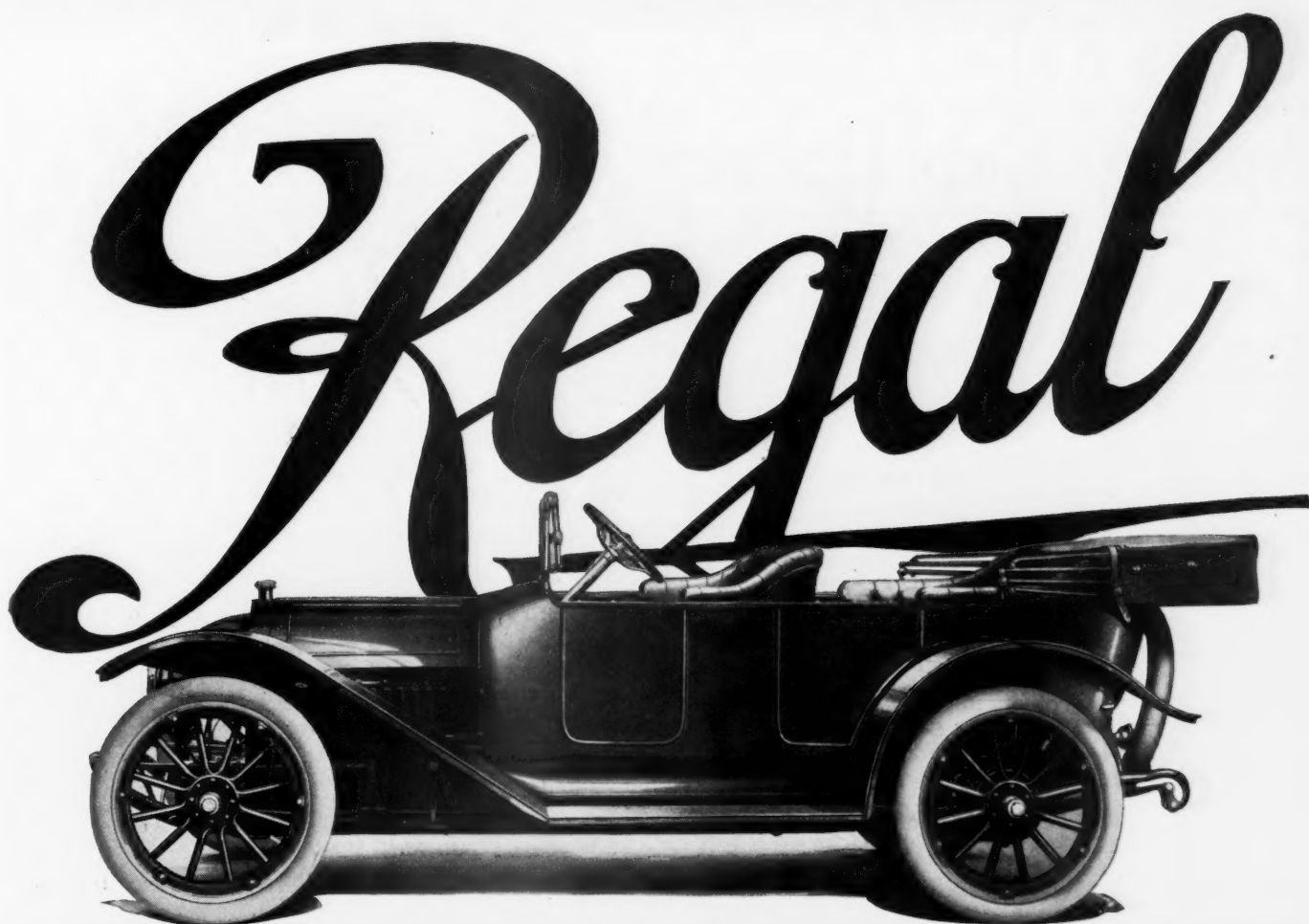


*Jiffy Curtains as applied to the "One Man" top.*

Abbott-Detroit  
Chandler-Six  
Franklin  
Hupmobile  
Howard-Six  
Hudson  
Haynes  
Keeton  
Knox  
Krit  
Lewis  
Lexington  
Locomobile  
Lozier  
Luverne  
Maxwell  
Mitchell  
Monarch  
Oakland  
Oldsmobile  
Palmer-Singer  
Packard  
Paige  
Pierce-Arrow  
Pilot  
Regal  
Studebaker  
Speedwell  
Stevens-Duryea  
White  
Winton  
Willys-Knight



*Look for this tag on right rear curtain*



**Model T—The Famous Regal Underslung**

*5-passenger touring car, electrically started and lighted. Completely equipped.  
Price \$1125, f. o. b. Detroit.*

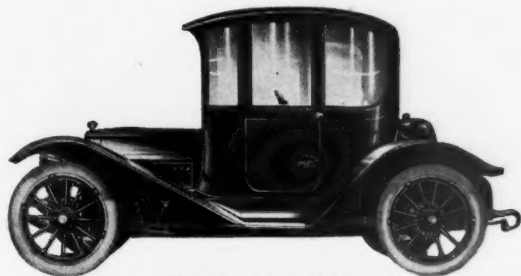
## The Car That Has "Made Good" For Seven Years

**T**HE safest car—the Regal underslung will keep the road under conditions that would ditch or overturn the ordinary car.

The exclusive Regal construction permits a special spring suspension that

means easiest-riding; and this in turn means less wear on parts, less fuel, and less oil.

Popular-priced cars are divided into two classes—the Regal and the rest. And your own comparison will prove the Regal the best.



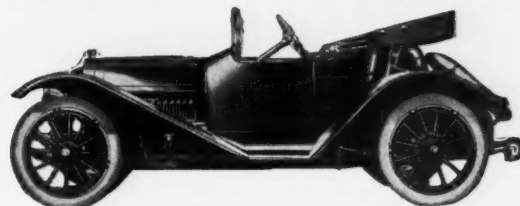
**REGAL COUPE**

*The perfect all-the-year-round car. Impervious to the elements in winter; easily thrown open to the breezes when warm weather comes; every operating mechanism inside; completely equipped, including electric starting and lighting. Price \$1600, f. o. b. Detroit.*

## REGAL MOTOR CAR COMPANY

123 Piquette Ave.

DETROIT, MICHIGAN



**REGAL MODEL N ROADSTER**

*The ideal small-family or professional man's car. Completely equipped; electrically started and lighted. Price \$1125, f. o. b. Detroit.*

*When Writing to Advertisers, Please Mention Motor Age.*

# Cross Rolled Steel in Springs Cuts Upkeep



**Cleveland-  
Canton  
Automobile  
Springs**

Steel experts have reached the limit, they say, in the new process used in making steel for Cleveland-Canton Chrome-Vanadium Automobile Springs.

This process is exactly the reverse of old-style methods, where bars are rolled longitudinally only.

In this new, patented method, the material is worked both *longitudinally* and *transversely*, or as it is termed, "cross-rolled." By working the material in two directions, an astound-

ingly uniform, homogeneous, tough, springy steel is obtained.

Then it is tempered by a special process, heat-treated with oil, given three exacting tests, and finally fitted by hand.

No other springs are made like these. No other springs have such endurance, such strength.

## Cross-Rolled Chrome-Vanadium

**"Not a  
Bump in  
One of  
Them"**

**"Built for  
Life-Long  
Endurance"**

Motorists who know Chrome-Vanadium Springs enjoy real comfort, real safety.

For such springs protect the engine and delicate mechanism as no other springs can do.

These are reasons why Cleveland-Canton Chrome-Vanadium Springs are, being used on

thousands of new cars this year; why makers who have adopted them will never go back to ordinary springs; why our output increased 100% over last year. You ought to know more about springs so unusual as these. We'll be glad to figure with you, and give you full information. Write today.

**Best Grade—Chrome-Vanadium  
Next Best — Special Analysis**

**The Cleveland-Canton Spring Co.**  
Canton, Ohio, U. S. A.





# Is Your Distribution All Right?

**YOU MAY HAVE** splendid apparatus — good generator, battery and all that—and still have trouble.

**EVEN THOUGH YOU PAID** a good price to have the material installed — there's danger of trouble.

**DON'T** overlook this fact.

**THE CABLES** that carry the current are mighty important.

Look well to your distribution.

WHAT WOULD YOU THINK of an automobile maker who built every part of his car with the utmost care—except the transmission? Suppose he had a good engine and then wasted half its power getting it applied to the wheels?

YOU WOULD SAY that he didn't have the correct idea of the relative importance of the various parts of his power unit and driving mechanism.

AND YOU WOULD BE RIGHT—yet, sometimes the manufacturer and even the repair man underestimates the importance of this **distribution** item when it comes to the electrical apparatus.

HE INSTALLS a good magneto, lighting generator or motor-generator, a good battery and well-made lamps—then fails to provide for this most vital thing—the **distributing** of the current from dynamo, magneto or battery to the devices using the current.

OH YES HE USES CABLE—but thinking to save a little money, he puts on cable that cannot stand the injurious effects of oil, heat, etc.

AND WHAT HAPPENS?—A thousand things happen—all of them unpleasant. At the end of it all, it is found that some part of the wiring went bad and thereafter everything else went bad.

AND WHO SUFFERS?—the manufacturer, the car owner, the maker of the lighting and starting system, repair man, battery maker, lamp maker, and so on all along the line.

CHEAP CABLE IS NEVER AN ECONOMY. The little saving in first cost is more than offset by the danger of imperfect service.

IT ISN'T ENOUGH that the job looks good and works good when first installed—IT MUST STAND UP IN SERVICE.

ON THIS POINT of standing up and giving service we want you to get one big idea—



## Does Stand Up In Service

BECAUSE IT DOES RESIST oil, heat, water and rough usage. You pay more for it AT FIRST, for which we make no apology.

BUT FIGURE PACKARD CABLE'S COST-PER-CAR-MILE OF PERFECT SERVICE AND YOU'LL FIND A REAL ECONOMY.

We make 27 different kinds of cable, a special construction for each and every service required.

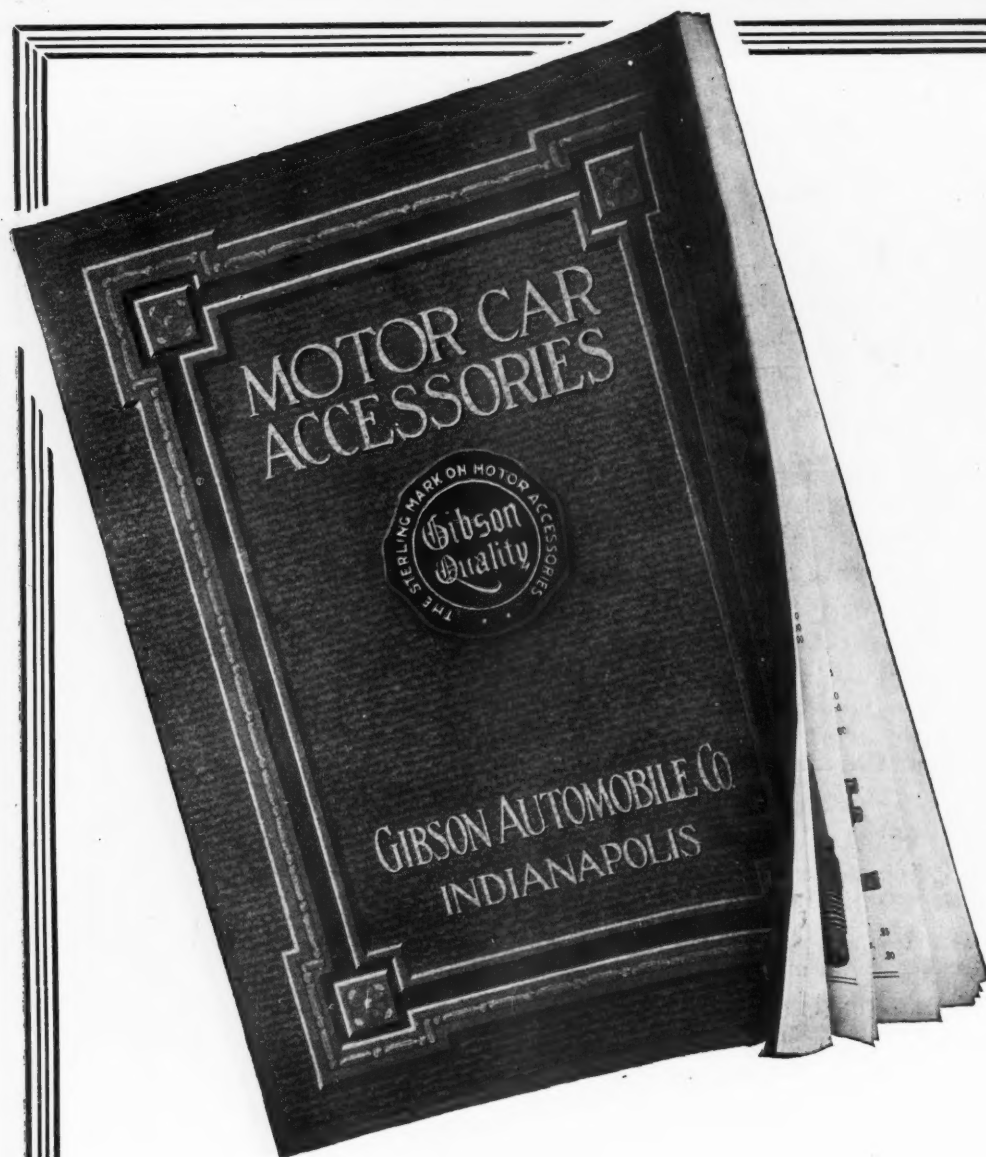
Write for sample card folder showing construction, exact size and natural colors of 16 samples of ignition, lighting and starting cable.

**The Packard Electric Company**

Dept. C

Warren, Ohio

(85)



## An unusual opportunity for You!

The results coming from the announcement of this wonderful text-book have been surprisingly satisfactory. Requests from legitimate automobile dealers, repairmen and garage owners over almost the entire United States, are coming to us daily.

The supply of these catalogues is limited. It is necessary for you to act quickly. You don't want to be left out. We are not satisfied because we already serve 5,500 dealers—we want to serve YOU. Our first step is offering you, merely for the asking, the most complete—the most concise—and the most dependable catalogue that has ever been published on any line of automobile accessories.

*Do not put off writing for this catalogue another minute. Act NOW!*



**GIBSON AUTOMOBILE COMPANY**  
210 AUTOMOBILE ROW  
INDIANAPOLIS





Maxwell <sup>25</sup>/<sub>4</sub> \$750

# All the Automobile Any Man Needs

A car designed for those discriminating buyers who yet must consider the pocket-book—or who, able to pay more, don't choose

to—and who want a light family touring car of ample power to go anywhere; of reliability that guarantees a pleasurable return sans road troubles of any kind.

A car that will perform; but also a car that looks the part; a car for the man who considers his automobile an everyday necessity and who counts the cost. A car that is economical in cost of upkeep—gasoline, oil and tire consumption.

You have often said you would be willing to pay a little more for a car that looked a lot better.

This is the car. It has been designed

**Maxwell 25-4 \$750**  
5-Passenger Touring Car

from your standpoint—for thousands of others have expressed the same desire you expressed. Knowing the need—the de-

mand—we have designed to meet it.

And it's made just as well as it's designed. Every ounce of metal that goes into it has been specified by our chief metallurgist, after the most exhaustive analyses and tests to determine the kind of metal, the alloy and heat treatment that would best meet the requirements and perform the functions of that particular part.

Better material does not enter into the construction of any car without a mental reservation—and every dollar we have, and our reputation, stand back of it, to guarantee every owner satisfaction.

## Maxwell Motor Company, (Inc.)

Detroit, Michigan

Dealers and Service Everywhere



# Automobiles Motor Trucks Accessories

as advertised in 1913 in twenty-one publications:

Publications	Number of Accounts Automobiles	Number of Accounts Motor Trucks	Number of Accounts Accessories	Total	Publications
Literary Digest	42	18	73	133	Literary Digest
S. E. Post	51	9	69	129	S. E. Post
Collier's	42	9	62	113	Collier's
Life	40	11	47	98	Life
Sci. American	26	8	37	71	Sci. American
Rev. of Reviews	19	8	34	61	Rev. of Reviews
Cosmopolitan	28	2	30	60	Cosmopolitan
Everybody's	17	2	23	42	Everybody's
Country Life	20	—	19	39	Country Life
Scribner's	16	4	13	33	Scribner's
McClure's	15	2	15	32	McClure's
Vogue	25	1	4	30	Vogue
Harper's Mag.	16	2	10	28	Harper's Mag.
World's Work	7	5	13	25	World's Work
Munsey's	11	1	12	24	Munsey's
Leslie's	9	3	11	23	Leslie's
Century	14	1	7	22	Century
American	7	1	11	19	American
System	2	10	6	18	System
Chr. Herald	6	1	5	12	Chr. Herald

Complete details giving the names of the advertisers and the number of lines used in each publication as well as the number of accounts are included in a folder issued by The Digest. We shall be pleased to send you a copy on request.

You will be interested to note that The Digest circulation in January exceeded 300,000 copies and that in total business we gained 1,001 lines over 1912. We are confident that business for 1914 will be exceptionally good and we know that we have begun the year with the biggest January in our history.

300,000 subscribers for The Literary Digest  
own a total of 115,000 Automobiles.

## The Literary Digest

# Overhauling Time Is the Time To Install

## *The* **DANN OIL CUSHION SPRING INSERT**

*"The Insert of 10,000 Oil Pockets"*

Don't put up with squeaky, rusty, improperly lubricated springs this year as you did last. Don't let "dry" springs shake hundreds of dollars off the value of your car. Don't be annoyed with spring breakage. Don't let a hard-riding, "bumpy" car spoil your motoring pleasure.

When you have your car overhauled this year tell your garageman or repairman to "Oil Cushionize" your springs with DANN Insert. Then forget your car HAS springs. Springs equipped with DANN Insert require no attention whatever. **THEY REMAIN PERMANENTLY AND PERFECTLY LUBRICATED FOR FROM TWO TO THREE YEARS!**

### **Springs Equipped With Dann Insert Never Rust**

Springs that never rust never solidify—never become conductors of the very thing they were designed to absorb—VIBRATION! Vibration KILLS machinery. Perfectly lubricated springs are **NATURAL SHOCK ABSORBERS** which smother vibration before it gets to a car's more delicate mechanism. **SPRINGS EQUIPPED WITH DANN INSERT, BY ABSORBING VIBRATION, BY PROTECTING ALL WORKING PARTS FROM DEADLY ROAD "POUND," ADD MATERIALLY TO CAR LIFE.**

No prudent motorist should overlook the slightest opportunity for making his car last as long as possible. Give **YOUR** car a chance. "Oil Cushionize"!

Pat.  
May 11, 1909.  
Other  
Patents Pending

The DANN Insert is a thin, perforated strip of specially compounded metal designed to be inserted between the spring leaves from tip to tip. The perforations in the Insert are packed with a heavy lubricant. The spring equipped with DANN Insert has approximately 10,000 oil pockets in its construction.

**DEALERS:** Right now is DANN Insert time. Every car that enters your garage or repair shop is a live prospect for DANN Insert. Every motorist who SEES DANN Insert realizes that he NEEDS it. No man who can afford a car can afford to be without DANN Insert. Get our agency plan today. You meet with no competition, because DANN Insert is the only construction of its kind on the market.

The DANN Insert is standard equipment on the Borland Electric, the Standard Motor Truck made in Warren, Ohio, and other leading makes of motor cars.

**FORD MOTORISTS!** The Schaefer Sales Corporation, 1501 Arcadia Building, Detroit, Mich., is prepared to supply Ford owners with Dann Ford Insert—cut to proper lengths, neatly packed in a box, and ready for immediate installation between the spring leaves of any Ford car. Complete instructions accompany each order, making it an easy matter for you or your garageman to "Oil Cushionize" your Ford springs with the utmost despatch.

Sample of Insert and Descriptive Literature on Request

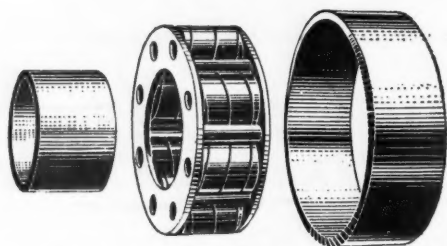
**"Oil Cushionize Your Springs!"**

**Dann Oil Cushion Spring Insert Co.**

2252 Indiana Avenue,

Chicago, Ill.

Ray  
view of  
Spring equipped  
with Dann insert



The Component Parts of a Hyatt Quiet Bearing.

**The small or inner race, on which the rollers operate, is made of special analysis alloy steel, heat treated and ground.**

**The cage contains the flexible spiral rollers that cushion road shocks, reduce noise, adjust irregularities in alignment and assure full line contact for the load. Rollers made of heat treated chrome nickel steel.**

**The large or outer race is made of the same material as the inner race and is mounted in the bearing housing.**

**The use of Hyatt Roller Bearings in your car insures dependable bearing service.**

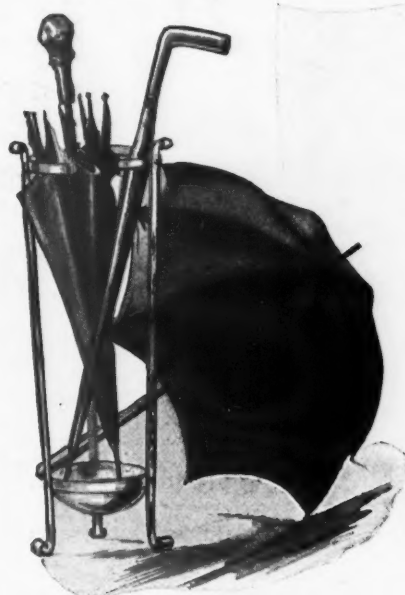
Two books, one about motorcar bearings in general for prospective purchasers, the other for automobile owners, will be sent on request

*"Hyatt Quiet Bearings"*

**HYATT ROLLER BEARING Co.**  
DETROIT, CHICAGO  
NEWARK, N.J.







## Who Ever Heard of a Rubber Umbrella?

**T**HE functions of an umbrella and an automobile top are almost identical. The purpose of each is the same, yet there is no such thing as a rubber umbrella. Is there any good reason why there should be rubber in an automobile top cloth, except as mentioned in our previous announcements that such cloths have been make-shifts pending the advent of a perfect automobile top cloth.

An umbrella is made of one piece, single thickness cloth, free from all chemical compositions, yet it affords complete protection.

Laidlaw Burbank Motor Cloth is one solid piece of cloth free from rubber or artificial leather compounds. There is nothing in Bur-

bank to dry out, crack, decompose, peel, blister or rub off. These weaknesses do and always will exist in rubber interlined or artificial leather surface-coated cloths.

An umbrella is an extremely practical article which opens conveniently and folds compactly, and a good one will give excellent service for years. All because there is nothing chemical about it to be affected by heat or cold or long continued folding.

Laidlaw Burbank Motor Cloth possesses every one of the features and characteristics of a perfect top material, and retains them under the most severe and trying conditions, for a period of time longer than the life of the car.



# The Laidlaw Company, Inc.

126-132 West 46th Street

New York, N. Y.



## Where Could You Buy More?

Study the complete equipment that goes with a Glide Model 30—study the guarantee that backs the materials and construction—then ask yourself where could \$1195 buy more?

Westinghouse Electric Starting,  
Lighting and Ignition System  
Unit Power Plant  
Long Stroke Motor  
Center Control  
Left Side Drive  
Gasoline Tank Under Cowl Dash  
114 Inch Wheelbase

Motor Driven Tire Pump  
Floating Rear Axle, with Pressed  
Steel Housing  
Demountable Rims  
Tire Irons for Extra Tire  
Stream Line Body with Concealed  
Hinges and Built-In Windshield

And, with the above, the price includes *Top, Electric Horn, Speedometer, Spare Demountable Rim Jack, Tool Kit and Flash Lamp.*

The Model 30 Glide offers everything you could ask for in style and comfort, and its daily use everywhere proves that it provides all you want in power and endurance. Write for catalogs. Ask for catalog on Glide Model 36, selling at \$1840.

**Dealers:** Let us tell you how easily and satisfactorily you can make good profits with the Glide agency. Please write us.

**The Bartholomew Co., 215 Glide St., Peoria, Ill.**

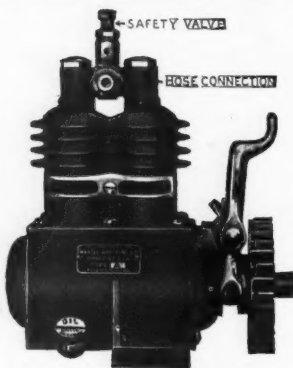
## THE MANZEL TWO CYLINDER ENGINE DRIVEN TIRE PUMP

Inflates any Tire in from two to three minutes

**"The Engine Does the Work"**

### Built Like an Engine

The "Manzel" Tire Pump is built like an engine. Its pistons, piston rings and cylinders are of the best cast iron and machined with the greatest accuracy. The connecting rods and bearings are of bronze, crank shaft of steel and crank case of aluminum. There are no rubber discs or leather parts to wear out or that require replacing. The pump could not be better made if it were an automobile motor.



### Complete Fittings Furnished

We have complete fittings for attaching to the Abbott-Detroit, Buick, Cadillac, Cartecar, Chalmers, Hudson, Howard, Mitchell, Maxwell, Oakland, Overland, Packard, Paige-Detroit, Reo, Studebaker, Stutz and many other cars. Everything furnished complete.

### REMEMBER

when you buy a "Manzel" pump you get everything complete, ready for installation on your car. There is no machine work to be done when attaching it, nor are the services of a mechanic required. Any automobile owner can attach it to his own car in less than one hour's time.

Write for Catalogue To-day

**MANZEL BROTHERS CO.,**

**306 Babcock St., Buffalo, N. Y.**

# BANKRUPT SALE

## Automobile Plant

All tangible assets of the American Motors Company, of Indianapolis, Indiana, will be offered for sale Monday, March 30, 1914, at 10 a. m., at public auction to the highest bidder for cash, at their General Offices, situated at corner of Illinois and Henry Streets in City of Indianapolis, Indiana. Assets include machinery, tools, dies, patterns, equipment, supplies, parts, repairs, furniture and fixtures; automobiles completed and in process of manufacture; interest in sales agencies and all rights, equities, patent rights, good will, interest and all other assets, except accounts and bills receivable. For full information address the undersigned.

FRANK E. SMITH,  
Trustee in Bankruptcy,  
American Motors Company,  
Indianapolis, Indiana.

# BUDA MOTOR

*"The part that sells the car"*

**has taken contracts away from competitors  
at higher prices, at lower prices, at equal prices.**

**Because,** on scientific **laboratory** tests, on **factory** tests, on practical **road** tests, on the test of the **sales floor**, and on the greatest test of all — long years of **use** — BUDA Motor shows the good qualities that only the best can have.

**Car Owners are as much interested in this as Car Manufacturers**

**THE BUDA COMPANY**

FACTORY, HARVEY, ILL., (Chicago Suburb)

Address all correspondence to our **FACTORY REPRESENTATIVES**

**BRANDENBURG & COMPANY**

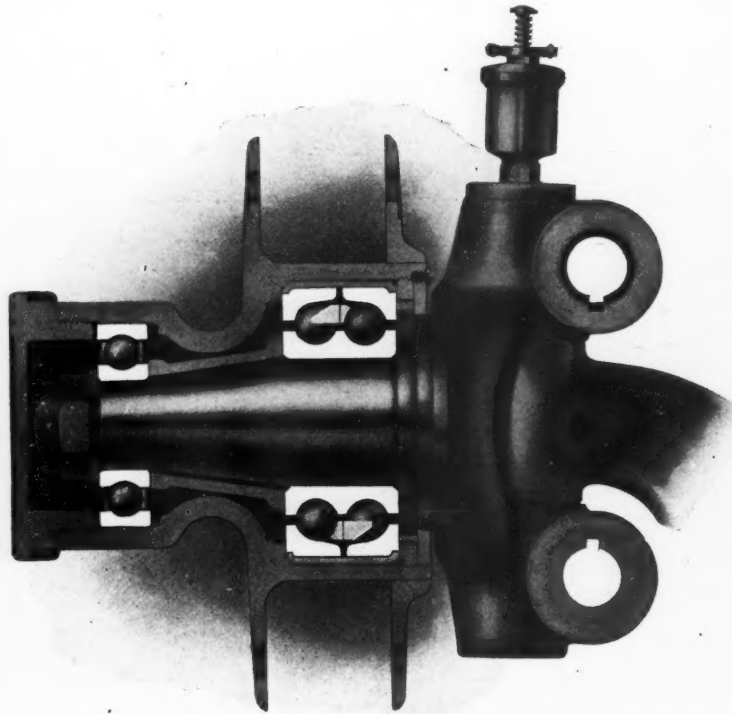
1108 S. MICHIGAN AVE., CHICAGO

FORD BUILDING, DETROIT

57TH & BROADWAY, NEW YORK CITY

*When Writing to Advertisers, Please Mention Motor Age.*





## The Ideal Front Hub Bearing—

Least Friction  
Least Wear  
Least Operating Expense

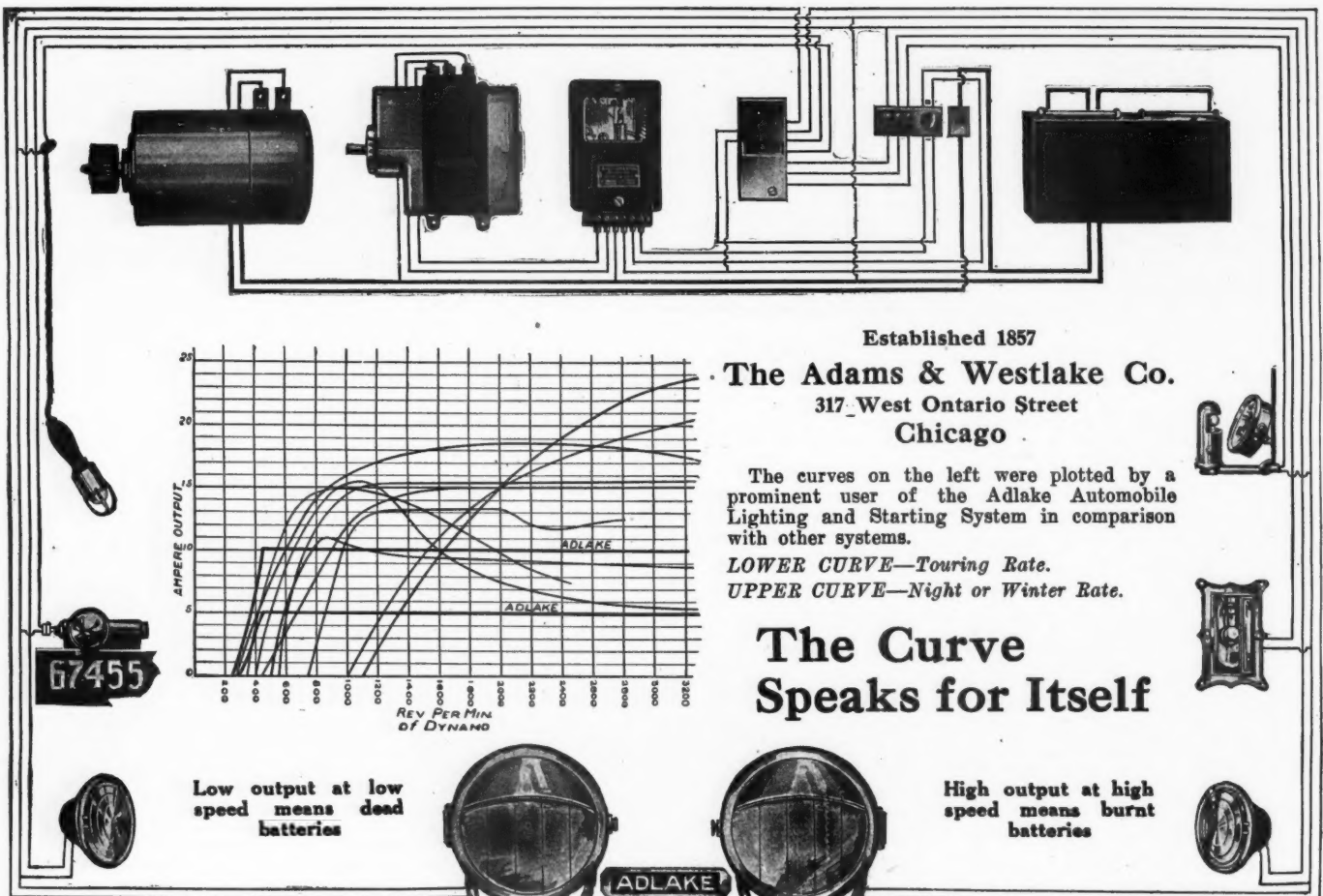
The review of 1914 pleasure car models published by The Automobile, shows 61 per cent of the front wheels mounted on ball bearings exclusively.

The ideal ball bearing front hub employs the New Departure double row or double capacity bearing, which not only carries greater radial load than any other type of anti-friction bearing, but at the same time sustains the severe end thrust stresses, which occur at this point, without fuel consuming friction or rapid deterioration.

**The New Departure Mfg. Co.**

**Bristol, Conn.**

WESTERN BRANCH, 1016-17 FORD BLDG., DETROIT



ON a "SIMPLEX 50," an tested several well-known owner in Glens Falls, N. Y. tires in succession.

Then he tried Englebert Tyres and forthwith ceased experimenting, for they yielded "almost one-third more mileage than any other make that I have tried."



TYRES

MADE IN BELGIUM

ENGLEBERT

ENGLEBERT TYRE CO., 1928 BROADWAY, NEW YORK

## Where the shock absorber falls down

that's just where the AMES EQUALIZING SPRING makes good—  
The real hard bump that is beyond the capabilities of a complicated shock absorber—  
The racking vibration and series of shocks—that the various shock absorbers cannot adjust themselves quick enough to overcome—  
That body-sway and pitching resultant from flexible underslung springs—  
Cannot be controlled other than by the



(Patented)

### AMES EQUALIZING SPRING

Revised Prices, 1914,

including the necessary spacing blocks and longer clips for attaching.

1 1/2" wide.....	\$8.00 per pair	2" wide.....	\$12.00 per pair
1 3/4" wide.....	\$10.00 per pair	2 1/4" wide.....	\$14.00 per pair
2 1/2" wide.....	\$15.00 per pair		

Conforms to the lines of the spring and cannot be seen unless you look for it. Measure your springs and see what your car can be equipped for. Insist that your new car be Ames Equalized.

Dealers—Write for particulars.

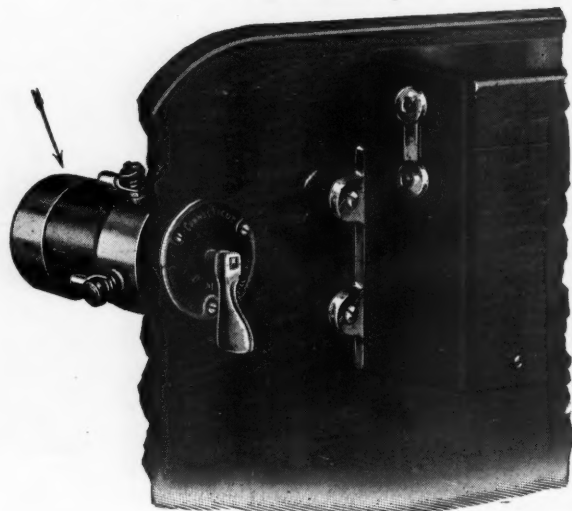
### Clarence N. Peacock & Company

1790 Broadway  
New York, N. Y., Dept. I

Exclusive Licensees

5986 Center Ave.,  
Pittsburgh, Pa.

## Made For Ford Cars



The alternating current Master Vibrator shown above is fitted with a standard Connecticut switch. It insures an easy starting, smooth-running motor with more power from the engine.

If you want to equip your Ford car with a master vibrator which fits flush with the dash and does not detract from its trim appearance, purchase this

### Special Type



## Master Vibrator

Requires adjustment but two or three times a year—uses minimum current—gives real magneto service.

A dependable Master Vibrator at a reasonable price—delivered without extra charge.

**Price \$9.00**

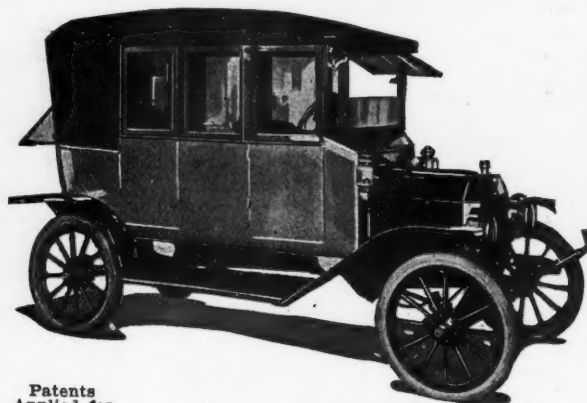
From your dealer or delivered on receipt of price

Write for Bulletin No. 36

**Connecticut Tel. and Electric Company, Inc.**  
MERIDEN, CONN.

# LEWKOWICZ

Give Pleasure Comfort Protection  
**CONVERTIBLE BODIES**



Patents  
Applied for

**Converted**  
IN LESS THAN

**ONE MINUTE'S TIME**

FROM A

**Touring Car to a Closed Car**

WITHOUT THE USE OF

**Any Tools! Screws! Bolts! Pins!**



Patents  
Applied for

**Manufactured for EVERY MAKE of CAR**  
FROM A

**Ford to a Pierce Arrow**

**PRIVATE OWNERS---**Write for particulars on your cars!

**AGENTS---**Write for our agency proposition!

**MANUFACTURERS---**Write for license rights for this wonderful invention which is a necessity today!

**Convertible Automobile  
Body Corporation**

OFFICE AND FACTORY:

1885 Park Ave., cor. 128th St., New York City  
Phone 3478 Harlem





# GABRIEL SNUBBERS

**\$15, \$20, \$25, per set of Four; two front and two rear.  
Half this per pair**

Ask the Engineering Department of your car for their opinion of Gabriel Snubbers. They have tested them out and know what they will do.

Used with success on every type, make and size of car, except the underslung.

Standard Factory Equipment on Peerless, Stearns, White, Oldsmobile and Lozier. Partial or special equipment on over twenty other leaders. Universally recognized as a necessity on large cars—needed even more on small cars owing to shorter wheel-base and less expensive spring suspension.

Stop and think of the added comfort, and of the actual saving in upkeep expense, to say nothing of the thousands of miles more service your car will give when protected by Gabriel Snubbers.

**GABRIEL HORN MFG. CO.,** 1415 East 40th Street **CLEVELAND, OHIO**  
We also manufacture the famous GABRIEL Musical Horns and Windshield Cleaners



## Every Drop of EAGLEINE NO-KARBON OIL Means a Saving to You

Down to the very last drop, EAGLEINE NO-KARBON OIL gives you perfect lubrication.

If you value the life of your motor do not feed it carbonizing, impure oil. Get the oil which, by actual test, has been proved to contain less impurities than any other oil on the market.

The motorist who is oil-wise, uses none other than EAGLEINE NO-KARBON OIL. It is the purest, safest, most satisfactory oil in the automobile industry.

### EAGLE OIL & SUPPLY COMPANY

Chicago Branch:  
1114 W. 37th St.  
Chicago, Ill.

104 Broad St., Boston, Mass.

Roger W. Stadlman  
21 Hoover St.  
Los Angeles, Cal.



When Writing to Advertisers, Please Mention Motor Age.

**\$250<sup>00</sup> A MONTH**  
**MAKING**  
**Repairing** AUTO MOBILE **Tires**

Sounds like a lot of money—**IT IS—A WHOLE LOT of MONEY** to be earning CLEAR every month—yet it's what hundreds of men we have established in the Automobile Tire Repair Business are making. You let down the **DRAW BRIDGE** for **SUCCESS** to enter into your career by getting into business for yourself. The business for you is the one where investment is small—the returns quick and for cash—where the margin of profit is large—the demand for your **PRODUCT** or **SERVICE** constant and ever on the increase.

## A HAYWOOD TIRE REPAIR EQUIPMENT

answers to all of these requirements of Old Dame Fortune—The certainty of success in this business is as sure as anything in this world can be—Each year adds thousands of new Automobile Owners—they need YOU to keep their tires in service.

## Here Is Your Opportunity!

Be first to enter this new big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Every auto sold means more tires to mend. Automobile business is growing fast—enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnson, Tex., writes: "I have made as high as \$18 in a day." Another man who bought a plant September, 1911, writes he has cleared over \$3000.00. That's going some! Operate a plant as side line in connection with auto business—garage or as an independent business. Find neighborhood where there's a bunch of autos—get all the steady business besides transient work. Experience unnecessary. You learn quick. Simply follow directions—practice a few days on a couple of old tires and you'll be ready to coin money. Business comes fast and easy.

### Repair Tires At Home

Young men! and boys repair father's tires—get money he pays garage man. Get the neighbor's work. Make money to attend college or to start a garage and repair business.

**Auto Owners—Repair your own tires—save money—pay for your outfit in short time. We have outfits for home use. Anyhow, investigate. Send today for catalogue. See the wonderful possibilities in this marvelous field. Learn of the enormous money-making opportunities in this fascinating new business.**

**Haywood Tire & Equipment Co.**  
 720 N. Capital Ave., Indianapolis, Ind.

The New Money-Making Business  
 —Start Now—This Man is Making Money

Business Keeps Coming



## The Luxury of Life at the Hotel McAlpin

**WITHOUT** undue expense, the luxuries of the Hotel McAlpin will give you a brand new conception of modern hotel comforts.

The exquisite Louis Seize restaurant—Turkish, Russian and Hydro-Therapeutic Baths—Women's Floor—Men's Lounge with Buffet, Stenographic and Ticker Service—Roof Garden—Banquet Halls to the number of eight—these are only a few of the sumptuous features of the largest and safest hotel in the world.

Ideally situated at Broadway and 34th Street—with the Pennsylvania Terminal and the Grand Central Station a short distance away—with theatres, shops and great department stores at its very doors and car lines reaching everywhere, the Hotel McAlpin is admirably convenient both for travellers and people socially prominent in the city's life.

If you enjoy daintily appointed rooms and rarely flavored food, stay at the McAlpin when you come to New York. Its tariffs are notable for their moderation.

Management of MERRY & BOOMER

## HOTEL McALPIN

*Herald Square*

## NEW YORK

*Nearer than Anything to Everything*



# Lee Tires



"Smile at Miles"

The talk of the  
whole rubber world

## "Vanadium" Rubber

Exclusive  
Lee Process

Doubly tough and resilient; extra lively and long-lived because of its greater density and perfected, standardized vulcanization—impossible except for the "Vanadium" process. In addition practically oil proof and a wonderful protection against water-rotting of fabric.

Used hereafter on all Lee tire products —

**Lee PUNCTURE-  
PROOF OR MONEY  
BACK.**  
**Pneumatic Tires**

Lee Regular Tires.

Lee "Zig-Zag" Non-Skid.

Lee "Velvet" Red Inner Tubes.

— and on Lee products exclusively.

Lee tires are 12 1/2% oversize of average moulded tire.

The autoist who wants increased service, the dealer who wants increased sales — both need "Vanadium" Rubber.

An interesting booklet, descriptive of its discovery, its manufacture and its service, is now on press — free on request if you mention this publication. Dealers — write for Trade Proposition.

Write today  
for this  
Descriptive  
Booklet "U"

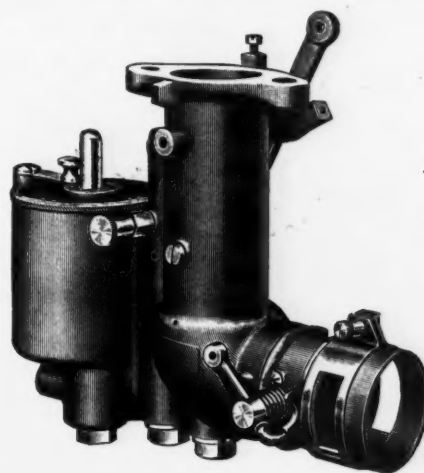
LEE TIRE & RUBBER CO.  
Conshohocken, Pa.

KELLY-FIELD CO.

General Sales Agents  
1737 Broadway, New York City

## ALTITUDE

When Garros in his Bleriot aeroplane flew nearly three miles above the surface of the earth he used the standard carburetor of Europe—the Zenith—because the Zenith requires no adjustment, no thought—regardless of conditions—once it is properly installed.



**The Birdmen** There are scientific reasons of Europe which have led many of Europe's foremost Birdmen to choose the Zenith for altitude, for distance and for speed. What Zenith, with its compound nozzle, can do for these daring aviators it will most certainly do for your motor car at any altitude or under any conditions. Ask Europe.

**A Message to Car Builders** Three big factories in France, Germany and England are supplying over 150 leading makes of European motor cars with the Zenith. 125,000 of these famous devices are marking a new era in efficient economy on machines in every corner of the globe. Why is this so? What does the Zenith incorporate that is exceptional? That is the next step toward improving your product for 1915. Write us—The American Zenith—and ask, "Why."

**ZENITH**  
CARBURETOR CO.  
DETROIT MICHIGAN





Strongest at center where the greatest strain comes

### Where the Greatest Strain Comes, There the Tuthill Titanic is Strongest

The Tuthill Titanic of approved design is guaranteed unreservedly against breakage at the **CENTER**—where 75% of all springs snap. The Tuthill patent covers the only way to make a satisfactory spring. It eliminates the center bolt—making the part that bears the greatest strain **unbreakable**. An upward curve, in connection with a retaining plate, between two center clips that cannot slip, holds the leaves in position. This is an exclusive feature of Titanic Springs—no other springs have it.



**Tuthill**  
*Titanic Unbreakable*  
**Spring**

**Guaranteed Absolutely Against Center Breakage**

The steel in Tuthill Titans is of the highest quality. Two **Analyses** of each shipment are made to see that the quality always runs high. During process of manufacture, a series of **Rigid Tests**, given by man and machine, show that the Titanic has strength it never will be called upon to use.

A Tuthill Titanic is guaranteed unreservedly against center breakage. No other manufacturer can make this guarantee. It is in addition to the regular guarantee that goes with all Tuthill Springs—whether Titanic or otherwise. In case of breakage—a very remote possibility—it will be replaced and all express charges on the new spring will be assumed by us.

#### Tuthill Special Repair Service

The Tuthill Titanic is unbreakable, but motorists using other springs which do break will find our Service Department ready to express a Tuthill Spring for practically any make of car at a moment's notice. We keep a full stock. Thus can the car owner be assured of getting an unbreakable spring in place of the broken one, without undue loss of time. The Tuthill Spring costs no more than other springs of the same high quality—the profit to the dealer or repair man is larger—and the customer gets a better spring—The Tuthill Titanic.

The Tuthill Unbreakable Spring is the result of 32 years' successful experience in spring making. To put a Tuthill Spring on a car ends spring breakage. Specify The Tuthill Titanic. Write for price list today.

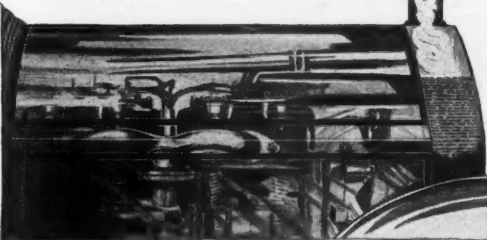
**TUTHILL SPRING CO.**  
762 Polk Street Chicago 1722



Tuthill Titans are guaranteed not to break at center

When Writing to Advertisers, Please Mention Motor Age.

## The Eye → that sees beneath the hood



## Boyce Motometer Wins

### Vanderbilt Cup Race

- 1st. De Palma, Mercedes—Motometer equipped
- 2nd. Oldfield, Mercer—Motometer equipped
- 3d. Carlson, Mason—Motometer equipped

### Grand Prize Race

- 1st. Pullen, Mercer—Motometer equipped
- 2nd. Ball, Marmon—Motometer equipped
- 3d. Taylor, Alco—Motometer equipped.

In both these classic events every car that finished was equipped with a Boyce Motometer.

Exclusive sales agents wanted. Write at once.

**THE MOTOMETER CO., Inc.**

1790 Broadway

New York

## The Dowst Magazine Binder



will quickly and securely bind each magazine as received. It binds one magazine or a complete file without mutilating, such as punching a hole in the magazine, gluing, lacing, etc. No strings, clamps, springs or locks used.

Retains at all times the appearance of a neat and substantially bound book, no matter whether there is one magazine in the binder or a complete file. Nothing complicated, nothing to get out of order.

Through a special arrangement with the manufacturers, **MOTOR AGE** will be pleased to furnish Dowst Binders to its subscribers at \$1.50 each.

Each binder holds 13 copies of "The Car Owners' Weekly."

**MOTOR AGE**

1006 Karpen Building, Chicago, Ill.



Type A S  
For Starting, Lighting  
and Ignition

## These Are The Right Batteries For Your Gasoline Car

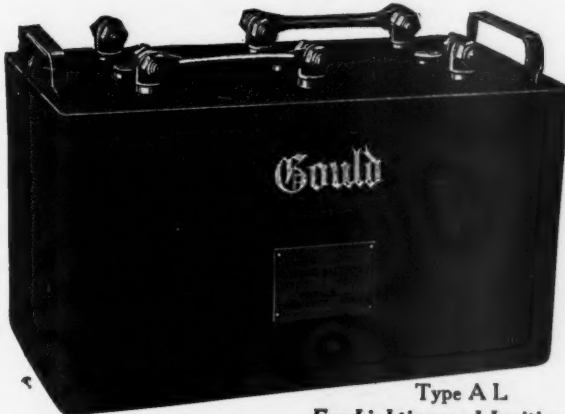
The plates of these Gould Batteries resist wear, retain their capacity, resist dislodging of the active material through overcharge, withstand hard service conditions and eliminate damage from jarring and vibration to an extent not found in batteries of any other make. This, because only a THIN LAYER of the plate surface, instead of the entire mass, is softened in producing the necessary capacity.

The group of cells, in hard rubber jar, is enclosed in a strong hardwood box and the design of the terminals, hard and soft rubber elements and pitch seal are such that LEAKAGE OF ACID AND CORROSION OF THE TERMINALS ARE PREVENTED ABSOLUTELY.

The terminals are out where they are of easy access, and the heavy connections are applied in a way that assures constantly perfect electrical contact.

DO YOURSELF AND US THE JUSTICE OF MAKING A TRIAL INSTALLATION.

Ask for our literature



Type A L  
For Lighting and Ignition

## Gould Storage Battery Co.

GENERAL OFFICES: 30 EAST 42nd ST., NEW YORK

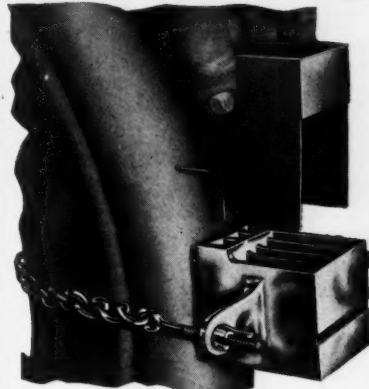
Boston: 14 Cambria St. Philadelphia: 613 Betz Bldg. Chicago: The Rookery. Detroit: Boyer Building. Cleveland: American Trust Building. San Francisco: 904 Rialto Building.

WORKS: Depew, New York.

Agents in: Washington, Kansas City, Denver, Topeka, Los Angeles, Seattle. Canadian Representative, R. E. T. Pringle: Toronto, Montreal, Winnipeg, Vancouver.

Full stock of parts, plates, and repairs carried by all offices and agents.

# Here's \$1.50 For You



Patent Pending

\$5.00 marked down to \$3.50. That's the story of our 1914 plans on Positive Portable Steam Tire Vulcanizers. At \$5.00 it represented the best value in vulcanizers offered American motorists. At \$3.50 it wipes out competition.

### Same Vulcanizer Same Guarantee

Nothing is changed but the price. Poor products hurt good ones. So we are wiping them out in the vulcanizer industry via the price route. This plan leaves \$1.50 in your pocket and you get a vulcanizer that thousands of motorists endorse. A complete outfit, including scissors, measure, repair gum and tube stock, comes with every

## Positive Portable Steam Tire Vulcanizer

Mends any ragged or clean-cut hole in tube or casing up to 2½ inches, in one 20-minute setting. Larger holes require another setting. Uses water and gasoline. Kerosene or alcohol may also be used instead of gasoline. Is portable and automatic, and simple in operation. We absolutely guarantee that our vulcanizer

### Will Not Burn Tires

Vulcanizes by steam—the only scientific vulcanizing agent—the method used in all the big factories. Pays for itself in a few weeks. Sold on a money-back guarantee of satisfaction. Ask your jobber or dealer or fill out coupon below and we'll send you full information direct.

**POSITIVE SUPPLY COMPANY**  
442 Rock Island St. Davenport, Iowa

Get This  
Into the  
Mails  
Right  
Now



POSITIVE SUPPLY CO.

442 Rock Island St., Davenport, Iowa

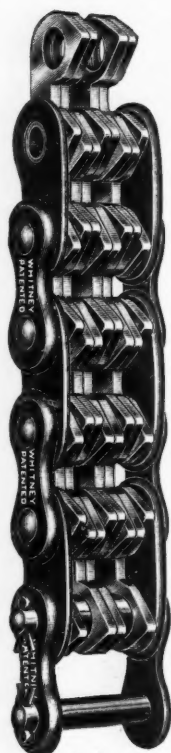
Please send me full particulars regarding your Positive Portable Steam Tire Vulcanizer.

Name .....

Address .....

My Dealer's Name is.....

[201]



## "WHITNEY" Silent Chains

For driving Cam Shafts, Magnetos, Lighting Systems, Generators, Pumps, Self-Starters, etc.

If you are contemplating the use of silent chains, don't fail to try the "Whitney." We have made chains for years and have the most complete and modern factory of its kind in the country.

We have completed a large addition to our factory and are now prepared to make prompt delivery.

Send for catalog D, it contains useful data and information for engineers and designers.

**The Whitney Mfg. Company**  
Hartford, Conn.



### For Value Received - - - \$1785 Apperson "Jack Rabbit" Four Forty-Five "The Wizard of the Hills"

It sells of itself and by itself as a Motor Car in which there are units of value to the full amount of the purchase price.

Our thoroughly tried and proved-efficient selling campaigns bring the prospective purchaser to your door.

Some live territory still open for business-getting, up-to-date and financially responsible distributors. Terms that will prove attractive.

Address Department B for quick action and De Luxe Catalog showing full line—Light Four, \$1600.00; Standard Four, \$1785.00; Standard Six, \$2200.00.

**Apperson Bros. Automobile Co.**

KOKOMO, INDIANA

Chicago  
3900 Indiana Ave.

Portland, Oregon  
58 N. 23rd St.

Seattle, Wash.  
907 E. Pike St.

HIGH and  
LOW TENSION  
MAGNETOS



MASTER VIBRATORS  
ROAD SMOOTHERS  
AUTO LOCKS

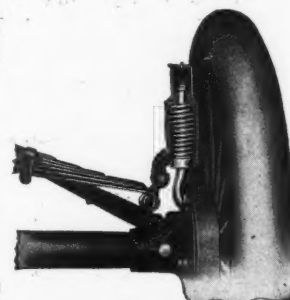
## Don't Wait for Good Roads



Make them by using  
**ROAD SMOOTHERS**  
For Ford Cars.

They work in harmony with the regular Ford Springs. They are shock preventers, not shock absorbers. Easy to apply—no holes to drill. Vanadium Springs.

K-W Road Smoothers add to your comfort, save your tires, and save the parts of your car from wear and tear. They are rigidly supported, which prevents your car from rocking from side to side, and materially reduces chances of skidding.



**A Set of Four  
Costs But \$25.00**

Right now when you are overhauling your old car or buying a new one is the time to put on K-W Road Smoothers.

Write for illustrated literature.

HEADLIGHTING  
OUTFITS

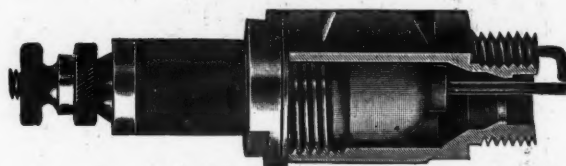
THE K-W IGNITION CO.  
2853 CLEVELAND AVE.  
CLEVELAND, OHIO, U.S.A.

SPARK COILS  
SPARK PLUGS

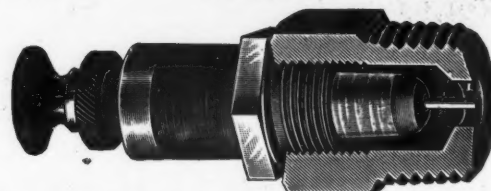
## THE OAKES & DOW CO.

### SPARK PLUGS

SOOTLESS



COMET



For Highest Compression Engines

In an actual test of 12 best known makes of plugs, our "Sootless" made good—the other eleven could not stand up.

MANUFACTURED AT

15 Chardon Street

BOSTON, MASS.





**How's This \$7 For**

**The Brown Jr. Tire Pump Complete With 10 Feet of Woven Air Hose Tested to 500 lbs. Pressure.**

If you own a Ford or any other small car, you can't afford to break your back pumping up the tires.

The Brown Jr. will do the work for you more quickly and better than you can do it by hand.

Made of the same materials and on the same mechanical principles as the Brown Impulse Tire Pump, which is making good for more than 60,000 automobilists. Don't forget the price, \$7.00; \$8.50 if you want a Brown Q. D. Spark Plug and connections.

Write us or ask your dealer concerning this latest innovation.

**THE BROWN COMPANY**  
120 Bellevue Syracuse, N. Y.



Casting Weighing 1600 lbs. Worth \$180.00

## MONARCH

**system of Ox-Acetylene Welding and Carbon Removing for**

**"GARAGES," Manufacturers, Contractors, Machine-Shops, Foundries, Steel-mills, Railroad-shops, Street Railways, etc.**

In making broken parts good as new, and simplifying manufacture, The "MONARCH" system has worked wonders.

GARAGES use this machine for Welding, Brazing, Straightening, Soldering, Removing Carbon, etc.

Automobiles and other factories use the MONARCH system for Reclaiming defective castings, Filling

up misplaced holes, Adding bosses, etc.

Weld Castings.

Braze Buggy tire wires instantly.

Weld split pipes.

Correct mistakes in design.

Weld and straighten frames.

Bond steel rails at 1/10 the cost in 1/10 the time.

Boiler Shops—Make boilers and tanks any size, any gauge for any pressure, without a rivet. They look better, cost less and are stronger.

Also weld cracks from and between rivets, cracked tube plate bridges, broken mud rings, door frames, etc.

**The Field for the "Monarch" System Is Unlimited.**

Write to-day for full particulars, prices, etc.

**Monarch Manufacturing Co.**

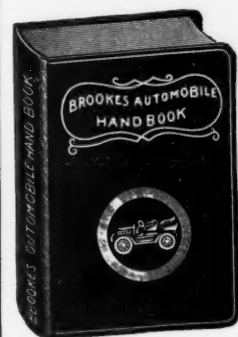
523 Stillwater Ave.

Dayton, Ohio, U. S. A.

Successors to STOP-A-LEAK CO.



Welded at a Cost of \$4.00



Size, 4½ x 6½  
**Price, \$2.00**

Revised and enlarged New edition. The largest and most practical work published. Used by all up-to-date automobile schools as their every-day text book. 700 pages and over 320 illustrations.

Full leather limp. Round corners. Red edges. Price, **\$2.00**

**New Edition 700 Pages**

## Brook's Automobile Hand Book

**"No obsolete methods"**

No "Misty" Rules from Bygone Authorities

Most complete and up-to-date work ever issued on the operation, care and repair of automobiles. No experiments suggested whatsoever. The practical text pertains to present day methods, methods which produce a maximum result.

At the present time nearly all automobile troubles or breakdowns may, in almost every case, be traced to the lack of knowledge or carelessness of the owner or operator of the car, rather than to the car itself.

The automobile hand book is a work of practical information for the use of owners, operators and automobile mechanics, giving full and concise information on all questions relating to the construction, care and operation of gasoline and electric automobiles, including road troubles, motor troubles, carburetor troubles, ignition troubles, battery troubles, clutch troubles, starting troubles. With numerous tables, useful rules and formulas, wiring diagrams and over 320 illustrations.

**The Class Journal Co.**

910 S. Michigan Ave.,

Chicago

**"WARNER GEARS—STANDARD FOR YEARS"**

"It's an absolute impossibility to 'open up' a plant and immediately deliver efficient gear assemblies.

"It takes time and experience—especially experience—to enable a concern to ship really dependable parts.

"This is an undisputable fact, no matter what the business happens to be.

"We are surely capable, in lieu of these facts, as for thirteen years we have been manufacturing automobile gear parts for the most successful and best-known motor car manufacturers in the country.

"And listen, what is more, we've been pleasing them in every particular.

"Is there any better proof of a product's merit than one hundred per cent of satisfied customers?

"Looks as if we ought to be able to please you too."

# WARNER GEAR CO. MUNCIE-IND.

DETROIT OFFICE—628 FORD B'L'D'G.



**The Apple Electric Company**  
67 Canal Street Dayton, Ohio

America's Leading Manufacturer of

**Electrical Equipment**

for

**Motor Cars**

**Motor Trucks**

and

**Motor Boats**

**Electric Engine Starters**

**Electric Lighting Outfits**

(for Motor Cars)

**Electric Engine Starters**

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**The Famous Apelco Storage Batteries**

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WRITE FOR BULLETINS

**The Apple Electric Company**  
67 Canal Street, Dayton, Ohio



**"Of the People,  
By the People, For the People"**

Lincoln's own words fitly describe the purpose back of the Lincoln Highway. If Lincoln were here and could select his own memorial it would be something useful like this road—something of and by and for the people. Every man cannot be a Lincoln. It is given to all, however, to act in the spirit of Lincoln, the spirit of sacrifice, of devotion to the public good, of pure patriotism.

You would resent the suggestion that you are not patriotic. But what have you done recently to prove it? There are ten million men in this country who could send this sum and never miss it. And as many more who could send it without hurting. If half of this number WOULD send \$5, the success of the Lincoln Highway would be ABSOLUTELY assured. This Highway will be a magnificent monument to Abraham Lincoln—but as age succeeds age, it will be a still more magnificent monument to the common sense, the far-seeing wisdom and the patriotism of the generation—our generation—that built it.

If you don't take part in this great work, you will have a sneaking feeling of shame all your life whenever the Lincoln Highway is mentioned. Send the \$5 and you will always have a glow of pride in the thought that you helped to adorn your country with this great road stretching like a silver ribbon from blue ocean to blue ocean, binding together States and cities and rural communities in bonds more firm than those of law and language. Mail \$5 or more today to A. R. Pardington, 2115 Dime Bank Building, Detroit, Michigan.

Pennant illustrated is in four colors, 36 inches long, at \$1.00 per pair (rights and lefts). Decorate your car. Be a BOOSTER.

**The Lincoln Highway Association, Detroit, Mich.**

Space contributed by MOTOR AGE.

Copy contributed by H. W. Ford, President Saxon Motor Car Co.



## MAYO SPARK PLUG PUMP

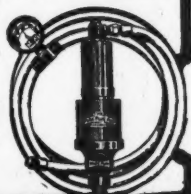
Adaptable to all size cars. Instantly attached by substituting for any spark plug. MAYO Quick Detachable Spark Plug may be used if desired. Pumps pure, fresh air only. Inflates largest tire in from 3 to 4 minutes. Built with metal rings like a motor and will last as long. Weight, 2½ lbs. An occasional drop of oil the only attention it requires. Price complete, with pressure gauge, 12 ft. hose, all connections—\$10.00. Quick Detachable Spark Plug, \$1.50 extra.

COMPLETE  
WITH GAUGE

**\$10**

Try One Free on Your Car for  
30 Days. Write Us.

**Mayo Mfg. Company**  
55 E. 18th St., Chicago, Ill.



**Starts — Lights — Ignites**

# REMY

**Six Volt System—Does-It-All**

## The Remy Starting—Lighting—Igniting Apparatus

Has been adopted by these exacting manufacturers, whose cars are listed below—BECAUSE Remy products have proven themselves 100% efficient:

Stutz	Premier	National
Reo	Studebaker	Mitchell-Lewis
Auburn	Marathon	Detroit
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Remy country-wide system of service stations is a valuable sales asset to YOU.

**Modernize Your Old Cars—  
Investigate Our Exchange Proposition**

**REMY ELECTRIC COMPANY**

Laboratories—Factories—General Offices  
ANDERSON, INDIANA, U. S. A.





### SPLITDORF PLUGS

are the real standard of plugdom—soot-proof, gas-proof, & unbreakable. SPLITDORF PLUGS are ECONOMIC in that they "stand up" under the hardest usage better than any other plug on the market.

Insist upon SPLITDORF.

Write to nearest Branch House for Details

### SPLITDORF ELECTRICAL CO.

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Boston—180-182 Mass. Ave.  
Chicago—64-72 E. 14th St.  
Cincinnati—811 Race St.  
Dallas—402 S. Ervay St.  
Detroit—972 Woodward Ave.  
Kansas City—1823 Grand Ave.  
Los Angeles—1226 S. Olive St.

Newark—290 Halsey St.  
New York—18-20 W. 63d St.  
Philadelphia—210-12 N. 13th  
San Francisco—1028 Geary St.  
Seattle—1625 Broadway  
Toronto—469 Yonge St.  
Dayton, Minneapolis  
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## Acme Torsion Springs



Could we make a stronger guarantee? And notice it is not a mere claim—it is a positive guarantee. WHY? Because ACME TORSION SPRINGS are based on SCIENTIFIC PRINCIPLES, properly applied. ACME TORSION SPRINGS, the only practical device on the market that can act FREE with, and CONTINUOUSLY IN CONJUNCTION with the LEAF SPRINGS, any way they are called upon to work, and adjust themselves MECHANICALLY to all conditions.

**We Challenge Contradiction of Our Claims**  
Get an Expert's Opinion

Equip your car with **ACME TORSION SPRINGS**

Insurance for life of occupants, car and easy riding. Don't be fooled by "shock absorbers." What you want is more spring capacity under proper Automatic Control. Acme Torsion Springs add at least 18 feet to the total leaf spring area, every inch adding greater resiliency automatically controlled.

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Write today for information.

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Acme Torsion Springs are covered by letters of patent, and we have the sole and exclusive right to manufacture, use and sell the same. Take warning that our interests will be protected.

## "Hook On This Autowline I'll Pull You Out"



### BASLINE AUTOWLINE

is the motorist's sure reliance in getting out of road difficulties. A car in a ditch, or a "dead" engine at the foot of a hill, doesn't trouble this little, pliant, 25-foot puller!

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"The Little Steel Rope With The Big Pull"

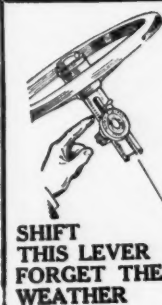
has the flexibility, toughness and staying qualities of the world's most famous steel wire rope—"YELLOW STRAND." It will take a two-ton car up a 20% rise without a quiver. It's always ready to take a tow or give one. Neat, compact, easy to carry and easy to use—motorists are finding Basline Autowline the one accessory they can't afford to forget. Sold by all dealers everywhere. East of the Rocky Mountains, \$3.95. Ask about it today.

**FREE** An illustrated circular giving all needful Autowline information

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Manufacturers of famous Yellow Strand Wire Rope that helped build the new Municipal Building, New York.



## Try a Motzinger THIS Year

This spring, when you have your car overhauled, tell the garageman to remove your old carburetor and substitute a MOTSINGER. A carburetor that is guaranteed to increase mileage at no sacrifice in power deserves a trial.

**Motsinger**  
Carburetor Increased mileage guaranteed

The MOTSINGER is what engineers call an "all-weather" carburetor. You can instantly adjust it so that every change in temperature, altitude or humidity may be taken advantage of.

Write for interesting literature describing how and why we can guarantee the MOTSINGER to pay for itself.

**THE LEVER WEIGHS OUT A JUST RIGHT MIXTURE HERE**

You have control of your carburetor's economy the year through.

Try a Motzinger on Your Car or Truck.

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You can take a thousand miles of service out of a set of tires by driving them insufficiently inflated over ten miles of road.

*Use the New Positive Lock Stop*  
**TWITCHELL AIR GAUGE**

and save your tires



"TIRE INSURANCE FOR \$1.00"

Simple, Accurate, Durable and Easily Read

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Keep Tires in  
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Send For Free Book

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that tells what to do for every kind of tire trouble. Every motorist should read it.

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Republic Staggard Tread, Pat. Sept. 15-22, 1908



Among your friends are men—exceptionally keen, shrewd, far-sighted fellows—whose business judgment you respect.

These men are pretty sure to have the Republic Tire on their cars. Ask them what they think of it.

If you do this, your next tires will be Republics.

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Youngstown, Ohio

Branches and Agencies in the Principal Cities

## UNIVERSAL VULCANIZER

**Tire Cuts Rain Casings**  
They admit moisture to the carcass, cause the fabric to rot and weaken, grow larger—end in blowouts. You can repair casings and inner tubes anywhere in 15 minutes, good as a repair shop can do—and for one cent.

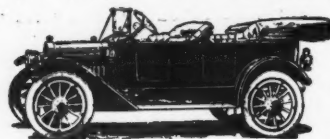
A Practical Vulcanizing Outfit Complete, with enough repair gum to make thirty patches. Weighs 3 pounds, can be carried in tool box.

Price complete, \$3.50  
Ready for Instant Use. At your dealers, or we will send it prepaid. Guaranteed satisfactory or money refunded.

**ADAMSON MFG. CO.,**



Patented April 2, 1912, April 1, 1918  
**East Palestine, Ohio**



NOW  
**\$900**

**EMPIRE**  
"The Little Aristocrat"

**Completely  
Equipped**

New Series Model 31, 110 Inch Wheel Base

A larger, more beautiful car, with every luxury and equipment.

Increased production brings the price down to \$900.

With Remy Electric Starting and Lighting System \$1025

Advance catalogue with complete details is ready

Get a copy of the illustrated story of the Transcontinental Empire. Forty pictures.

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**GEARLESS TRANSMISSION**

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**SMOOTH—QUIET—POWERFUL**  
**Model 7, \$1250**  
Other Models \$1600, \$1700, \$1900, \$2000  
*Write for full particulars and catalogue*  
**Cartercar Company** Pontiac Michigan

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**GAS, OIL, AND ELECTRIC**  
CORCORAN LAMP CO.  
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## V-Ray Spark Plugs

*Give More Power  
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Possess a superiority that has never been questioned; cannot be injured by heat or oil

**Sold with a Guarantee**

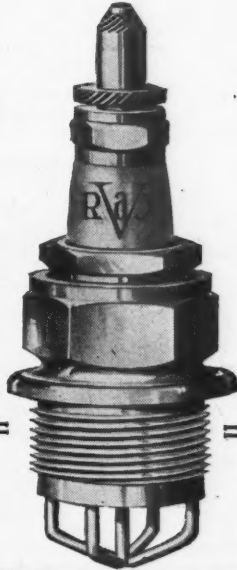
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Porcelain  
SPARK PLUG  
\$1.00

"Mika"  
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For Sale by  
ALL JOBBERS  
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**The  
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TROY TRAILER WITH A 5-TON LOAD

## Figure What the Troy Trailer Can Do for You

This Troy Trailer is loaded with 5 tons, and the Truck with 4 tons. The material is plaster in 100 lb. bags. It made a run of 13 4/10 miles in 55 minutes, climbed one 11% grade 300 feet long and one 14% grade 150 feet long.

On long and short hauls, we know the Troy Trailer can make your truck pay big. Tell us about your work and we will show you how. Get Bulletin M.

**The Troy Wagon Works Co.**

Clay Street  
TROY Miami County

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## Have You Read This Week's Classified Columns?

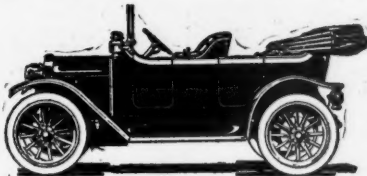
They contain numerous advertisements of interest to you.

It makes no difference what you are looking for—whether a factory superintendent, salesman, foreman or chauffeur—you will find the man listed in MOTOR AGE classified columns.

*The* **Detroit**

**\$850 and \$900**  
Completely equipped

Five  
Passenger  
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Car



28 H. P.  
Long  
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Motor

Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car.

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Weston Model 267 Dashboard Ammeter

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for control of Electric Lighting and Self-Starting Systems are the most reliable, durable and highest grade instruments made for this purpose

Please send for our 30-page bulletin No. 8 describing them

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**No Moving Parts**

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A discriminating public has voted in favor of Solars—the quality motor lamps.

Backed by 15 years of specialization. Found on more high-grade cars than all other makes of lamps.

A Solar Lamp for every motor need.

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**THE BADGER BRASS MFG. CO.**  
KENOSHA, WIS. NEW YORK CITY

## HOUK Detachable WIRE WHEELS

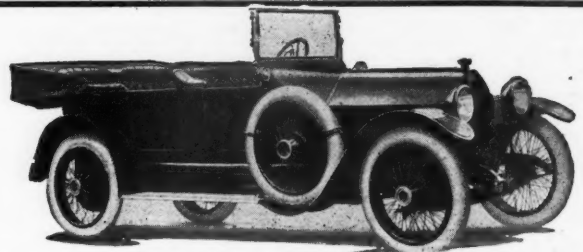
"The wheel that makes any car modern"

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For George W. Houk Co. (Licensed Under Rudge-Whitworth)

Standardized Transmissions

**COVERT**

Covert Motor Vehicle Co. Sales Office Detroit  
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Continental 6 P motor. Bosch Ignition. Brown-Lipe 4 speed forward transmission. Spicer Universal joints. Timken full floating rear axle. Timken front axle with Empico speedometer drive. Timken bearings throughout. Long radiator. One man top. Left drive, center control. Goodrich tires, 34 x 4½. Electric starting and lighting.

Two passenger .....\$2485  
Five passenger .....\$2485  
Seven passenger .....\$2535

**BENHAM MFG. CO.,**

**Detroit, Mich.**

### "THE TUGBOAT OF LAND COMMERCE"

SOLVES THE  
HEAVY TRUCKING  
PROBLEM

**Knox**

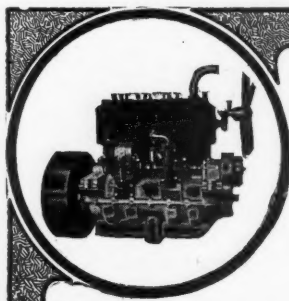
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TRACTOR**



SEND FOR CATALOGUE

**KNOX AUTO CO.,**

**SPRINGFIELD,  
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4 and 6 Cylinder Types

Not made to meet a price, nor to shatter records of quantity, but to fulfill a service ideal—to be a true

foundation for a worthy motor vehicle.

**Continental Motor Mfg. Co.**

Detroit, Mich.

Factory Representative, E. F. Peterson, 129 S. Mich. Ave., Chicago



## METZ "Twenty-Two" Roadster

**THE GEARLESS CAR**

"No clutch to slip—no gears to strip."



1914

Improvements

**Completely Equipped**

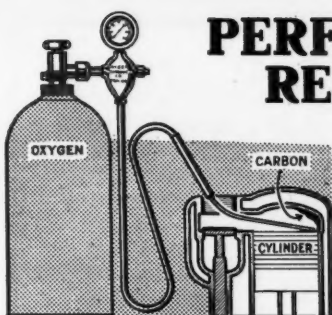
Center control, left-hand drive, 4-cylinder 22½ H. P. water cooled motor. Bosch magneto, standard artillery wheels, best quality clincher tires, extension top, windshield, five lamps, gas generator, tools, etc. Makes 5 to 50 miles per hour on the high speed, 28 to 32 miles on 1 gallon of gasoline, and is a wonderful hill climber. A strong, reliable, stylish, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory. Write at once for Book "K" and particulars.

**METZ COMPANY**

**WALTHAM, MASS., U. S. A.**

**\$475**





## PERFECT CARBON REMOVER \$10

Will remove all carbon from cylinders Easily and in few minutes. Equal of any high-priced outfit. All parts guaranteed. Keeps up efficiency of cars and trucks. Big money maker for garages.

**Price \$10 (without oxygen tank)**

Usual price \$15. As we sell for cash only and no accounts carried, customers are given \$5.00 off on every outfit. Express companies allow inspection—you take no chances.

*Sent prepaid—cash with order or C. O. D.*

OXYGEN DECARBONIZER CO., 301 River Street, Troy, N. Y.  
SEND FOR INFORMATION

## PREMIER AMERICA'S GREATEST TOURING CAR



PREMIER MOTOR MFG. CO.  
INDIANAPOLIS, INDIANA

## The Searchlight Gas Co.

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Stronger than ever, legally, financially and in the esteem of the trade. Watch us grow.

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## PAIGE

**Model "36" \$1275.00**

A car whose design and construction is so far ahead of others at its price that it is in a class all its own.

Gray and Davis Electric starting and lighting equipment, silent chain cam shaft drive, four inch by five inch motor, cork insert multiple disc clutch, 116 inch wheel base, left side drive, center control, and equipment complete to the last detail.

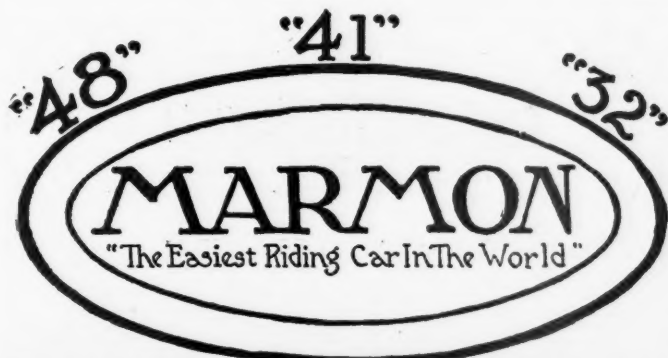
**Model "25" \$975.00**

**Including Electric Starting and Lighting System**

This model has made the Paige reputation. Such a sturdy, powerful, comfortable car has never been offered the public at anywhere near its price. \$975.00 with complete equipment.

**Splendid Agency Proposition**

Paige-Detroit Motor Car Co., 304 Twenty-First St., Detroit, Mich.



NORDYKE & MARMON CO.  
INDIANAPOLIS (ESTABLISHED 1851) INDIANA

## THE RUTENBER MOTOR

MANUFACTURED SINCE 1901 FOR HIGH GRADE  
**AUTOMOBILES AND TRUCKS**

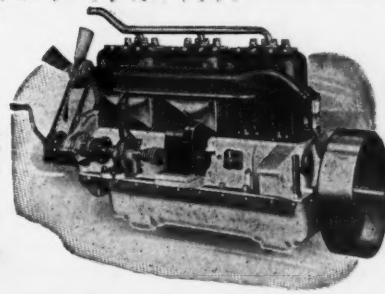
3½ x 5¼ four and six cyl.  
4½ x 5½ four cylinder  
4¾ x 5¾ four cylinder

Standard or Unit  
and

4 x 4, 4 cyl. standard type,  
all L head, 4 cycle

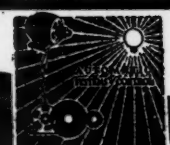
Manufacturers are invited to investigate our service and our facilities. Literature on request.

**The Rutenber  
Motor Company**  
Marion, Indiana



## WARD-LEONARD SYSTEM

WARD LEONARD



Lighting - Starting

**Faultless Lighting  
Infallible Starting**

WARD LEONARD ELECTRIC CO.  
BRONXVILLE, N. Y.

## STROMBERG CARBURETOR "The Accepted Standard"

**Stromberg Motor Devices Company**

54 E. 25th Street, Chicago, Ill.

Branches: NEW YORK, BOSTON, DETROIT, INDIANAPOLIS, MINNEAPOLIS

Pacific Coast Distributors: Chandler & Lyon Company, Los Angeles, Portland, Fresno, Spokane, San Francisco, Seattle

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Tires & Tubes**

**SERVICE and SATISFACTION**

The Only set of Tires to complete the entire 500-mile race at Indianapolis, May 30, 1913. Consider that 88 Tires of other makes were changed in this Race. Our "Victory Folder" explains other races.

**Braender Rubber & Tire Co.**  
Main Office & Factory **Rutherford, N.J.**  
New York, 1987 B'way. Chicago, The Alfred Co. Boston, Dayton Tire Co. Pittsburg, Keystone Motor Supply Co. Indianapolis, Brant Bros. Columbus, O., Franklin Rubber Co. Troy, N. Y., G. H. Snyder. Newark, N. J., Ketcham & Lawrie.

Established Agents  
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**Motors G-B & S Motors**




We beg to announce our latest four cylinder Unit Power Plant. This Motor includes the recognized engineering practice, here and abroad. "Craftsmanship of long experience is the result of this distinctive Power Plant."

Detailed information on request, and we are in a position to make prompt deliveries according to contract.

**GOLDEN, BELKNAP & SWARTZ CO.**  
DETROIT, MICH.

**\$2400**  
Completely Equipped



**MOLINE KNIGHT**

Four-cylinder, five-passenger, 50 horsepower, 128-in. wheelbase.

Bosch ignition, Wagner electric starting and lighting, \$2400.

The car of the future will not have poppet valves

**Moline Automobile Co., East Moline, Ill.**

**The Atwater Kent Ignition System**



For every kind and make of motor. A system ideal in efficiency, simplicity, and reliability.

Write today for booklet A.

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**WINTON SIX**

**YOU NEED THIS BOOK**

No car buyer wants to buy a loser. Avoid it by getting the facts. Our booklet on present conditions in the automobile industry will help you to know something about the situation. Ask for Book No. 41—it includes car description.

**The Winton Motor Car Co.**  
424 Berea Road, Cleveland, O.  
WORLD'S FIRST MAKER OF SIXES EXCLUSIVELY

**"Bridgeport"**  
TRADE MARK  
U.S.A. U.S.A.

**TIRE PUMPS**

Are easy to use and easy to sell. They are durable and efficient—and are widely advertised. The cylinders are of seamless brass tubing which cannot rust. The "Stapley," the "Aeolus," "Windjammer," etc., give lasting satisfaction. Carry them in stock.

**Bridgeport Brass Company**  
P. O. Box A Bridgeport, Conn.




**COMPLETE THRUST BEARING**

**The Star Ball Retainer Co.**  
Lancaster, Pa., U.S.A.



**RADIAL RETAINERS**

**Manufacturers of Radial Ball Retainers, Thrust Ball Retainers, Complete Thrust Bearings**

**Brictson Pneumatic Tires**

At last the pneumatic tire problem has been virtually solved—the weak points in previous tire construction have been eliminated. The resiliency of a Brictson Pneumatic Tire puts it in a class by itself. It is Puncture-proof—Blowout-proof—Skid-proof—Rut-proof—Blim-cut-proof—Oil-proof and Gasoline-proof.

**Ten Days' Free Trial**

To remove all doubt that might arise in the purchaser's mind and to back up our statements—we will allow 10 days' free trial on the first set that goes into each town.

**Your Tires Can Be Made Like This** →



If you are not in need of new tires and the fabric in your present tires is still good—we can rebuild them the Brictson Way—making them Puncture-Proof, Non-Skidding, Blowout-Proof, Rut-Proof, Oil-Proof and Blim-cut-Proof. Write today for full particulars, giving your dealer's name.

**THE BRICTSON MFG. CO.**  
1234 Brictson Bldg.,  
Brookings, So. Dak., U. S. A.



10,000 Mile Written Guarantee With every Brictson Heavy Special Tire there goes a 10,000 mile written guarantee which in itself proves their merit.



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FRICION REDUCING MOTOR OIL

Maintains the correct lubricating body at any motor speed or heat

**STANDARD OIL COMPANY**

(AN INDIANA CORPORATION)

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**AXLES WHEELS TRANSMISSIONS**

W & S Salisbury Wheel & Mfg. Co. W & S  
JAMESTOWN, N.Y.

### TRY THIS PLUG ONE MONTH AT OUR RISK



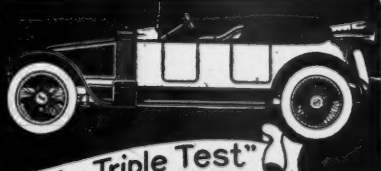
We know it will save you gasoline. We know it will enable your motor to develop increased power—but don't take our word for it. Convince yourself! Try a set of

**SU-DIG** Formerly called **SPARK PLUGS**  
Superior Double Ignition  
on your own car for a whole month. See for yourself the difference that perfect combustion (possible only with double ignition) actually makes. After a 30-days' trial, if SU-DIG SPARK PLUGS do not make good on every claim—return the set and we will promptly refund the purchase price without question. Fair enough? Then write us—today—do not fall to state name of car.

Send for illustrated folder—it contains information that will save you many dollars

**SUPERIOR MOTOR SPECIALTY COMPANY**  
46 N. 4th Street Philadelphia, Pa.

"SIX-48"  
**KEETON**  
\$3250  
FULLY EQUIPPED



Send for Booklet "The Triple Test"  
**CAR-NATION**  
THE CAR FOR THE AMERICAN PUBLIC  
\$495-\$520

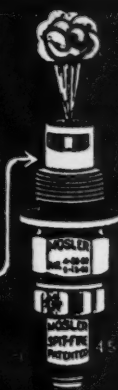
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DETROIT U. S. A.

**Mosler Spit Fire**  
Plugs  
are the BEST

FOR 13 YEARS HAVE BEEN LIKE THIS

INSIST ON OUR  
GENUINE PLATINUM POINTED PLUGS

A. R. MOSLER & CO.,  
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Think of the Company behind the car—and you'll realize why Fords and Government bonds are bought with equal assurance. Strongest financially—world-wide in scope—largest in volume of output. We build our reputation into the car. Better buy a Ford.

Five hundred dollars is the price of the Ford run-about; the touring car is five fifty; the town car seven fifty—f. o. b. Detroit, complete with equipment. Get catalog and particulars from any branch agent or from Ford Motor Co., Detroit, Mich.

## Automobile Bodies

We design and build all types, ranging from a roadster body to the highest grade limousine, either in the white or upholstered and painted complete. Consult us before contracting for your season's requirements.

**IRVIN ROBBINS & CO.,**  
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12 3/4" Overall

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Strong  
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Guaranteed

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## Brennan Standard High Grade Motors

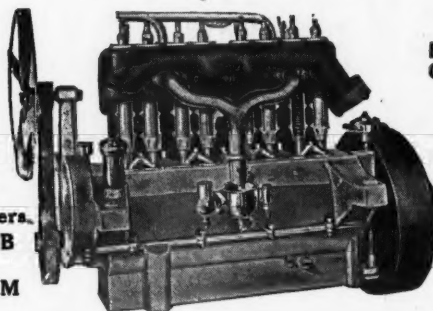
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4 1/2 x 5  
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4 x 5



4 Cyl., 5x5, 40 H. P., 4 Cyl., 4 1/2 x 5, 35 H. P.

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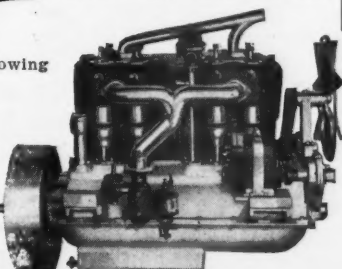
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Mechanically, perfect — Long diameter crank shaft — Automatic self-contained oiling system—Extra large bearings.



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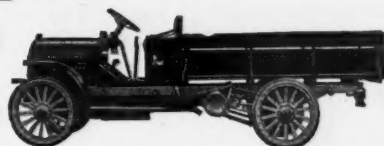
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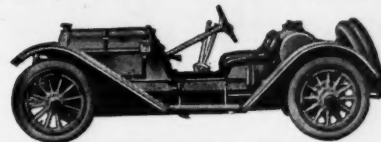
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**TOLEDO**

**THE WARNER MANUFACTURING CO.**  
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**Why Abuse Your Car**  
by oiling the finely finished bearings and greasing the gears  
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This effective and economical lubricant produces a film between the bearing surfaces, which will not thin out under the action of frictional heat and allow them to come together.

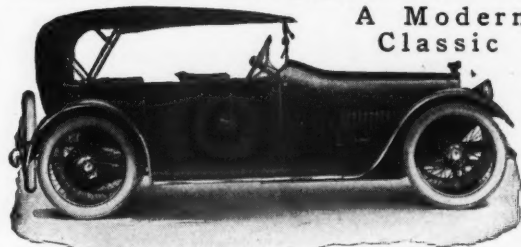
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Packed only in orange enameled cans bearing sprocket-wheel trade mark shown above.

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**FOURS & SIXES..\$1800 to \$3000**

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KRUPP AUTOMOBILE CRANK SHAFTS, STEEL FORGINGS AND FRAME MEMBERS,  
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Two "sixes" and a "four." Roadsters, touring and enclosed body cars.

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Each section 2 in. wide. They hook to rims. Try two or three sections over any old blowout.

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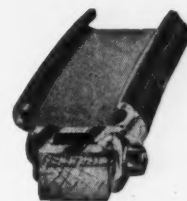
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gives all Metals the shine that won't come off. Always ready for use—no fuss—no muss—no waste. 20 cents, sample 4 cents. Live representatives wanted.  
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**AMERICAN UNDERSLUNG AND MARION** Motor car parts and service.

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Make your carbon burning outfit portable by using our portable all-steel truck for Linde tank. It will save you time and money. Write for circular and prices.  
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Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars.  
Muskegon Automobile Co.,  
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Send for our latest illustrated cut price catalogue of automobile accessories. Liberty Tire Co., 102 Chambers St., New York City.

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Seat covers and body building, remodeling and trimming. Write for prices.  
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Motors, Transmissions, Frames, Axles, Etc., Lamps, Horns, Fenders, Vibrating Coils \$2.00 up. Spark Plugs, Guaranteed, 25 cents. Let us know your needs.  
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## BALL &amp; ROLLER BEARINGS

All Types and Sizes  
We also repair or exchange all makes of ball bearings.  
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Foredoor six passenger bodies painted green, red, blue or brown, not upholstered. Send for photograph and dimensions. Size 34x101. When crated \$2.00 extra. Price \$10.00.

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34x4 Fisk casing and tube, slightly used, absolutely firsts, complete.....\$14.00  
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Exide Storage Batteries, 6 volt, 40 ampere ..... \$ 7.00 || Troy Windshield, nickel and black, rain vision, \$40.00 value..... | 12.50 |

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1914 New Ford T Roadster Bodies With Tops, \$50 Each. Taken off new cars we changed to delivery cars. Open express bodies \$15 up. New windshields, clear vision \$10. 32-inch solid rubber tires on wheels only \$12. Slightly used 34x4 detachable tires \$14, tubes \$3; like new and firsts. Benedict, 63 Winder St., Detroit, Mich.

**BOSCH DUAL MAGNETO, \$40.00**  
Type DR-4 (4-cylinder) vertical coil. Perfect condition guaranteed.  
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4½x5 "L" head 4-cylinder motors.....\$198.00  
30 H. P. chassis less unit power plant 135.00  
30 H. P. right-hand steering gear complete ..... 12.50 |

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**CHAUFFEURS MEMO PAD EASILY ATTACHED** to steering wheel, special price, 30c. Adjustable Accelerator Heel Rest, \$1.50. Orders filled promptly. H. C. Rich, 316 W. 44th St., New York.

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will make your auto top waterproof. Guaranteed not to stiffen or change the color. If you cannot obtain Coleman's Filler from your dealer write us direct. Small sample sent by express on receipt of 50 cents.  
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Seat covers for all cars.  
Write for full particulars.  
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60.00 radiator—many sizes and styles	15.00
100.00 magnetos .....	35.00
8.00 iron vises.....	3.19
15.00 electric horns .....	3.98
5.00 complete tool kits .....	1.09
50.00 steering gears .....	12.19
10.00 gasoline tanks—square.....	1.00
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Anything else? We have it. Send for a Big Bargain list of new goods being sold at this sale. Get on our mailing list.

Hundreds of other automobile parts and accessories are shown on our Big Bargain Sheet of goods sold at this sale.

Write for this quick.

WARREN MOTOR CAR CO.

51 Tenth St., Detroit, Mich.

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For E.M.F., Ford, Hudson, etc. One-piece aluminum. Easy to put on.  
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Reduce auto upkeep cost practically one-third by purchasing standard auto supplies through our new free Catalog. Justice Auto Casings and Tubes, standard construction throughout, at prices 25 per cent lower than others. We guarantee satisfactory service from them. Mail us a postal requesting Auto Supply Catalog No. 72M80.

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New 1914 Ford Bodies,  
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F. O. B. our factory.  
Including top and side curtains.  
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Ford fancy cast brass hub caps, which will not dent. Also fancy radiator caps. We make rain-vision hinges that can be attached to your shield. Write today.  
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Write us for commercial and racing bodies. Bucket seats, linoleum covered running boards, and glass tops.  
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**CLEVELAND'S LARGEST SUPPLY HOUSE**  
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car the easiest rider made with light or heavy load; no jolt, no jars, no upthrow. Write us. Thomas Auxillary Spring Co., Canisteo, N. Y.

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Bowser wheel tank, 50-gallon capacity. New hose and recording gauge. Guaranteed. \$120. Henry Skeggs, Stahlman Bldg., Nashville, Tenn.

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**FOR SALE—ONE 5 H. P. WESTINGHOUSE**  
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**T. C. Nichols Motor Car Co., Quincy, Ill.**

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Sole manufacturers and distributors of repair parts for  
**LION MOTOR PARTS CO.**  
**LOUIS J. BERGDOLL MOTOR CO.**  
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We have purchased the entire stock of parts, jigs, patterns, drawings, etc., of the above mentioned companies, and are prepared to fill orders for repair parts for all models of these cars; give name and number of cars when ordering parts. Price list on application.

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2200-2218 Diamond St., Philadelphia, Pa.

##### MAGNETOS EXCHANGED,

##### BOUGHT AND SOLD.

We repair any make of magnetos and coils.  
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Telephone Bomont 65; Central 9570L.

**MAGNETOS: WE HAVE 2,000 MODEL X**  
Splitdorf Magnetos, new Price, without coil, \$17.50 each; with coil, \$25.00 each.

The regular price of these is \$75.00. We also have other makes of magnetos at cut prices—in fact, everything for the automobile. Send for "OUR PRICE WRECKER"—the greatest money saver in the world.

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#### MICHIGAN, MORA AND DRAGON PARTS.

We have maintained the exclusive repair parts business of the Dragon Car since 1907 and on the Mora Car since 1910. We recently purchased the bulk of the stock and all repair parts of the Michigan Cars necessary to maintain the best service in this car also.

This stock together with our unexcelled machine shop equipment should afford Michigan car owners better service than the makers of the car could give. Our revised price list is now ready for distribution, same will be furnished on application, giving model, style and year of car.

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A black enameled lamp with one coat. Not affected by heat or cold. Does not crack, chip or peel. Made in either a gloss or dull finish. Ask your dealer.

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**NEW FOUR CYLINDER AUTOMOBILE**  
and 2 cylinder stationary engines. We solicit all kinds of machine work and guarantee satisfaction.

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A preserver for all rubber, leather and pantasote tops and curtains. Makes old tops like new. Ask your dealer.

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**OXY-ACETYLENE WELDING PLANT DE-**  
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Makes all faded, stained and spotted linings a black uniform color. Makes old linings like new. Ask your dealer.

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#### PAINT YOUR CAR YOURSELF

Save \$25 to \$75 by doing the work at home with the Arsenal system. Our big free booklet, "The Car Beautiful," tells how. Send for it today.

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Waterproofs leaking tops and makes old tops like new. Sold by garages, dealers and jobbers.

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**PUMP HOSE, BEST GRADE. JOB LOT OF**  
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Brightens and renews all leather seats and cushions. Will not wash or rub off. Dries in 20 minutes. Ask your dealer.

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**REPAIR MEN — REMAGNETIZE YOUR**  
own magnetos with latest and best electro-magnet coil, operated from dry-cell batteries, sold under an absolute guarantee. Price \$15.00.

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**RACING CHASSIS FOR SALE—JUST** overhauled; very fast; five-speed transmission; \$510. Write for specifications. Hugh F. Hunter, Owensboro, Ky.

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**SMASHED, FROZEN OR INEFFICIENT?** Write **WRIGHT RADIATOR MFG. CO.**, and have a better one shipped to you the same day order is received. The only radiator manufacturers who carry in stock hundreds of radiators, all of their own make and guaranteed to be the equal of any radiator made.

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NEW.

NEW.

Ford T .....	\$17.00
Buick F, 16, 17, 19, 26, 27, 28.....	30.00
Buick 10, 14, 32, 33.....	22.00
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"Put up a good front" by putting on our genuine guaranteed cellular radiators (commonly called Honeycomb).

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Equally attractive price on all popular models. Every one a new, complete radiator. Five per cent discount allowed for cash with order.

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#### REAL BARGAINS FOR PROMPT DELIVERY.

40-foot Prest-O-Lite gas tanks, new, filled, complete, worth \$25, for \$13.

Motorcycle size, worth \$10, for \$7.70. Lighter and patent burner cleaner free with each order.

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**RECTIFIERS TO CHARGE FROM A-C** circuit 1 to 8 ignition, lighting or starting batteries at one time; \$12 & upwards. American Battery Co., 1124 Fulton St., Chicago.

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Most accidents are caused by "cloudy" glass fronts. Our patented glass front cleaner removes rain, snow and "breath-steam" from windshield instantly. Made of brass; cannot rattle; always ready; operates from driver's seat. Send two dollar bill for one today and be safe. Tomorrow you might have accident costing two thousand, maybe life. **MARSHALL, WALTER & CO.**, Milwaukee, Wisconsin.

#### "SAVE YOUR GASOLINE."

We have 150 Rayfield carburetors, regular \$20.00 kind. Our price \$8.20 while they last. **PURITAN MACHINE CO.**,  
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Send for our low prices on materials of quality.

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**STOP THAT LEAK IN YOUR RADIATOR** with one ounce of Overton's Radiator Leak Compound. A pound can be parcels post for 50c cash. N. L. Overton, 1109 4th Ave., Council Bluffs, Iowa. Prices to Dealers.

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Keeps auto like new without washing. Prevents cracking and checking of varnish. Makes old cars like new. Guaranteed. Saves paint bills. Trial can 50c by mail. Enough for two months' treatment.

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**SCHLEBLER MODEL "L" CARBURETORS**, new 1½-inch, \$8.00 each. Order early. Kent Motor Car Co., Kenosha, Wis.

**START LITE GAS LIGHTER.** Light your gas lamps instantly from driver's seat without stopping. Regular price, \$15.00. Our price, \$8.00 complete. **FRED ALLEN AUTO SUPPLY CO.**,  
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Patented lock for Ford and other small cars. Impossible to start motor. Two keys with each lock. Sent prepaid, \$1.50. May save price of your car.

**MARSHALL, WALTER & CO.**,  
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**TOPS BUILT, RECOVERED AND REPAIRED.** Also Top Covers, Radiator Covers, Luggage Cases, Celluloid, etc. C. G. Meyer & Son, Tiffin, Ohio.

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200 in use in St. Louis. Prevents sagging and breaking of rear axle. Takes ten minutes to apply. Best on the market. Guaranteed two years. \$2.50 prepaid.

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#### THAT MYSTERIOUS RAG DUSTER.

For dusting and polishing automobile bodies, windshields, lamps, pianos or any other polished surface. House Size 25c. Automobile Size 50c. Sent to any address upon receipt of price. If not satisfied, return duster and we will refund purchase price.

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**TRUFFAULT - HARTFORD SHOCK ABSORBERS:** \$45.00 kind; \$20.00 set of four.

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**WE HAVE JUST TAKEN IN EXCHANGE** 2-ton Saurer chassis in fine condition. 4 speed transmission direct on 3d, 4 cyl. long motor. Bosch high tension magneto. Condon, 2635 Wabash Ave., Chicago.

**WE HAVE SEVERAL SLIGHTLY USED** magnetos which we will sell very cheap. **LUVERNE AUTOMOBILE CO.**,  
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**WE MAKE FORD RACING TYPE BODIES** in several models for immediate delivery. **AUTO SHEET METAL WORKS**,  
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#### WE TEAR 'EM UP AND SELL THE PIECES

We want old autos, condition no object. We will buy anything for the auto. We have all kinds of parts, many of them new, at unheard of low prices. Tires and tubes, many new, others used. Kingston carburetors, all sizes; will exchange for others. Gears of all kinds, new gas oval tanks, new timers, magnetos, coils. Stewart speedometers, shafts and chains, tire covers, dust hoods, electric horns, new brass bumpers, lamps, all kinds, Prest-o-Lite tanks, oilers, cylinders, pistons, transmissions, crankshafts, seats and bodies; new 30x3½ wheels, many other used sizes; rims; several chassis without engines, 2-cylinder, 4-cylinder, 6-cylinder engines, springs; in fact, everything that an auto needs. Correspondence solicited. If we do not have it, will advise you where you can get it. Anything bought can be returned at once, unused, carriage prepaid and we will refund amount paid.

**AUTO WRECKING CO.**,  
Old Church, 13th and Oak,  
KANSAS CITY, MO.

**WESTON MOTT HIGH GRADE REAR** axles, \$45.00. Other bargains, too. **PURITAN MACHINE CO.**,  
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#### 50c ON THE DOLLAR.

120-gal. Bowser pump, Weaver auto jacks, 3 vises, Dalton adding machine, 100 asst'd new plugs, all makes, 12½c each. Sturdy Mfg. Co., 2637 Mich. Ave., Chicago.

**50 NEW PRESSED STEEL FRAMES, 163"** long, 34" wide. Each, \$10.

Send for sketch.  
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#### FORD AUTOMOBILE SPECIALTIES.

Look for the APCO on the box. If you see this trade mark, you are safe in every way, for it means "Every sale a sale of satisfaction." Your money will be cheerfully refunded if you are at all dissatisfied. The APCO goods cost you no more, so insist and don't let your dealer sell you "something just as good" and on which all sales are final. He makes more money, but where do you get off? Remember if your dealer won't refund your money, we will. You buy APCO and let the other fellow get the imitation. Sold the World Over. **AUTO PARTS CO., PROVIDENCE, R. I.** The originators and largest manufacturers of Ford Specialties in the world.

#### Cycle Car Accessories

**FOR SALE, CHEAP—CYCLE CAR**, Friction complete, axles V pulleys and wheels, tires, steering gear, frame, etc; or will trade for motorcycle. Chas. Burger, 614 Cook St., Portage, Wis.

**FRONT AXLES, AUTO TYPE; BELT** drive rear axle, 36" and 42" tread; cable-cored V-belt; quarter elliptic springs.

**ENGINEERING EQUIP. CO.**,  
24 E. Wash St., Indianapolis, Ind.

**STEERING KNUCKLES, YOKES, FRONT** axles, springs, wheels, and friction transmissions.

**MINNEAPOLIS MOTOR CO. AGENCY**,  
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**V PULLEYS, 1½x7, ALSO FLAT BELT** pulleys 2x7.

**F. MacVicar**,  
214 Milton Ave., Syracuse, N. Y.

#### Cars Wanted

**AUTO WANTED—WILL LOAN YOU** money on your car or sell same. American Storage Co., 5025 Wabash Ave., Chicago, Ill. Phone Midway 3233.

**FOR SALE—160 A. FARM IN NORTHERN** Minn. at \$20.00 a.; improved A1 land. Will take small auto as part payment. E. H. Keller, Marshalltown, Ia.

**WANTED — FOR CASH, 5-PASSENGER** touring car; must not be older than 1913 or 1912. Address E. J. K., 2342 Millard Ave., Chicago.

**WANTED—TO TRADE 160 ACRES OF** land in Colorado for 1914 6-cylinder touring car. Chalmers or Buick preferred. G. W. Allen, Portland, Mich.

**WILL EXCHANGE FOR AUTOMOBILE A** most unusual and rare specimen of South American savagery valued at \$1,000. No junk considered. Address Box E57, care Motor Age.

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**WANTED—A PAIR OF SECOND-HAND** crankcases, or a motor for Cadillac 30 1909 car. John Franck, 226 Franck Ave., Louisville, Ky.

**WANTED—PREST-O-LITE AND SEARCH-** light tanks. State lowest price and condition of tank and size.  
City Garage, Monona, Iowa.

**WANTED — SECOND GARAGE EQUIP-** ment. Lathe, Drill press, Large air compressor and other garage equipment. Write me what you have giving price and full description.  
C. P. Buswell, Meriden, Iowa.



**WANTED TO BUY A GOOD 4 CYL. OR 6 cyl. gasoline motor.**  
Greer College of Motoring,  
1456 S. Wabash Ave., Chicago.

**WANTED—TO BUY A LIMOUSINE BODY**  
that can be used on a 1910 Chalmers 30.  
HALL'S GARAGE,  
Wausau, Wis.

**WANTED TO BUY—PREST-O-LITE AND**  
other make gas tanks for cash. Walter R.  
Ebert, 959 34th St., Milwaukee, Wis.

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**EXPERIENCED SALESMAN AND SALES-**  
manager, high and low priced cars, seeks  
connection with manufacturer or large dis-  
tributer. Deliver the goods; expects fair re-  
muneration. Box E 55, care Motor Age.

**EXPERIENCED SALESMAN, HAVING**  
eight years' experience selling automobiles,  
desires to connect with a distributor who  
would appreciate the services of a business  
producer. A-1 references. Address Box E 17,  
care Motor Age.

**PHILADELPHIA SALESMAN.**  
Ten years' experience, energetic, formerly  
Phila. Branch Mgr. for large corporation.  
Well known among Phila., Baltimore, and  
Washington Trade, is open for high grade  
proposition. Salary and commission. Address  
Box E 49, c/o Motor Age.

**POSITION AS SALES MANAGER OR AS-**  
sistant with well established automobile  
manufacturer or distributor. Have had  
seven years' experience in various executive  
capacities with prominent automobile con-  
cerns, including three years as sales man-  
ager. Have had a wide experience in the  
establishment of agencies and personal ac-  
quaintance with dealers throughout the  
country. If interested address Box E 54, care  
Motor Age.

**POSITION WANTED—MANAGER FIRST**  
class garage or foreman first class repair  
shop. Eight years' experience. Expert me-  
chanic, reliable, sober. Only solid firms an-  
swer. For further particulars address R. J.  
Marquard, 1026 N. Water St., Decatur, Ill.

**POSITION WANTED—SUPERINTENDENT**  
or assistant; 20 years of practical me-  
chanical experience; 12 years executive; thorough  
knowledge of piecework and premium sys-  
tems; a hustler and has always been very  
successful in getting results; at present em-  
ployed in responsible position. Address Box  
E 25, c/o Motor Age.

**TOP DEPT. OR FACTORY SUPT.**  
Man with 9 years' experience as head of  
top department and factory, desires similar  
position. Best credentials furnished. Address  
Box E 38, c/o Motor Age.

**YOUNG MAN, MARRIED, WANTS JOB IN**  
repair shop. First-class lathe man; seven  
years' experience at auto work; references.  
Must be steady position. J. E. Peterman,  
Box 289, Rawlins, Wyo.

**YOUNG MAN, 27, SINGLE, RECENTLY**  
out of college, would like position as dem-  
onstrator or salesman with factory branch  
or sales agency where there is a chance for  
advancement. Have been driving own cars  
for the last five years. Four years' business  
experience before going to college. Address  
Box E 47, c/o Motor Age.

## Help Wanted

**SALESMEN DESIRING A FINE QUICK-**  
selling, profitable side line, should address  
GATES MFG. CO.,  
Indianapolis, Ind.

**WANTED—A "FIRST-CLASS" REPAIR**  
man in garage, located in western Ill.;  
must be familiar with wiring and lathe  
work; state whether married and age, also  
what wages you demand, with A1 references.  
Address Box E 39 c/o Motor Age.

**SALESMEN WANTED FOR QUICK SELL-**  
ing automobile and hardware standard spe-  
cialties; exclusive territory to live men. Motor  
Parts Co., 229-231 W. Erie St., Chicago, Ill.

**"SALESMEN WANTED—TO HANDLE AN**  
excellent side line to the Garage and  
Motor Accessory Trade. Not a proposition  
for jobbers. A large company with an estab-  
lished reputation and with an advertised line  
can use a number of men. State line you  
are handling now, territory covered, refer-  
ences and consent of other houses repre-  
sented required. Give full information. Ad-  
dress, Gelhaus, 410 New St., Cincinnati, O."

**WANTED—A YOUNG MAN WHO THOR-**  
oughly understands the automobile busi-  
ness, to act as sales manager for distributor.  
Must have executive ability, be a good sales-  
man and a hustler. Give references. Ad-  
dress Box E 58, care Motor Age.

**WANTED APRIL FIRST.**  
Competent general repair man for steady  
position. Give references and full particu-  
lars as to experience and wages expected.  
Fredericksburg Auto Co.,  
Fredericksburg, Iowa.

**WANTED AT ONCE—WORKING SHOP**  
foreman for garage in small Illinois city.  
Must be able to handle all kinds of trouble  
and repairing and to manage a shop. Must  
show a good record for past work. Do not  
apply unless you can fill the bill. Give full  
particulars. Address Box E 50, c/o Motor  
Age.

**WANTED—AUTO ACCESSORY SALESMAN**  
to carry our line either as a complete or  
side line. Offer an attractive proposition in  
any state. Box E 18, c/o Motor Age.

**WANTED — CARBURETOR SALESMAN**  
and demonstrator. Must give best refer-  
ence. Address Box E 34, c/o Motor Age.

**WANTED—FIRST CLASS AUTO REPAIR**  
and lathe man; must have reference; state  
salary, experience and reference in first let-  
ter. Tennant Bros., Stanberry, Mo.

**WANTED—COMPETENT ALL AROUND**  
automobile repair man to take charge of  
small garage. Must have a fair knowledge  
of electric starters. Married man preferred.  
State salary expected and give references.  
Address, Box E 43, c/o Motor Age.

**WANTED—SALESMEN, BOTH TRAVEL-**  
ing and local, superintendents, designers,  
draftsmen, engineers, desiring to be placed in  
touch with high grade positions with auto-  
mobile factories, and who can hold such po-  
sitions down, should write immediately to  
The Michigan Co-operative Co., 1532 Dime  
Bank Bldg., Detroit, Michigan.

**WANTED—YOUNG MAN THOROUGHLY**  
familiar with the automobile accessory  
business, to take charge of the correspond-  
ence and generally supervise the mail order  
department of a large supply house; perma-  
nent position with good prospects; give re-  
ferences and full information in first letter.  
Box E 61, care Motor Age.

**WE ARE CONSTANTLY IN TOUCH WITH**  
Employers requiring High-Grade Engineer-  
ing service. Are you listed with The Toledo  
Engineering Agency, Toledo, Ohio?

## Wanted—Agents

**AGENTS WANTED.**  
Attractive terms to dealers on our Ampvo  
Batteries. Some exclusive territory still  
open.  
The Ampvo Battery Co.,  
3031 Michigan Ave., Chicago, Ill.

**AGENTS WANTED TO CALL ON GA-**  
rages, machine shops, factories, mills, etc.,  
selling extensively advertised welding ap-  
paratus. Demand already created. Will  
give exclusive territory together with co-  
operation to right parties. Exceptional com-  
mission.

COX BRASS MFG CO.,  
Albany, N. Y.

**AUTO ACCESSORY SALESMAN WANTED**  
to sell our guaranteed auto tire reliners,  
double locks, inner and outer shoes, etc.  
Liberal commission and exclusive territory.  
AMERICAN RUBBER PRODUCTS CO.,  
24 So. Clinton St., Chicago, Ill.

**EXCLUSIVE AND SIDE LINE SALESMEN**  
for spark plugs and accessories. Well  
established. Good chance for right man.  
Sturdy Mfg. Co., 2637 Mich. Ave., Chicago.

**MOTORISTS TURN LEISURE TIME INTO**  
money, selling tires to friends. Want local  
agents throughout Colorado, Wyoming, New  
Mexico and adjacent territory. Liberal com-  
mission. No investment required. Write for  
particulars. Boss Rubber Co., 1606 Broad-  
way, Denver, Colo.

**WANTED—AGENTS TO SELL PORTABLE**  
Welding plants, Oxygen carbon removers,  
Electric horns, C-Well rear sight Mirrors,  
Skidoo Soap and Milwaukee Auto Specialty  
Co.'s line. Exclusive territory and liberal  
commission to the right parties able to de-  
vote their entire time to their sales.  
STEWART AUTO ACCESSORIES CO.,  
1509 S. Michigan Ave., Chicago.

**YOU CAN GREATLY INCREASE YOUR**  
income by representing our line of light-  
ing systems; our MATCH LIGHTING  
LAMPS sell like wildfire both in town and  
rural districts. No experience required,  
profits large, exclusive territory to right par-  
ties. Don't delay writing for free catalogue  
and full information. Doud Lighting Co.,  
175-F No. Sangamon, Chicago.

## Agency Wanted

**ENGINEER TAKING A BUSINESS TRIP**  
to the Scandinavian countries during the  
summer months desires to represent Ameri-  
can automobile manufacturers. Speaks the  
Scandinavian languages. Box E 60, care Mo-  
tor Age.

**WANTED—EXCLUSIVE SPECIALTIES OR**  
patent right to manufacture by a well-  
organized New York sales corporation.  
Suite 1928, 30 Church St., New York City.

## Business Opportunities

**COURT STREET STORE IN BINGHAM-**  
ton, N. Y., a city over 62,000 population.  
Modern front 16x68; large light basement,  
steam heated, one of best locations and cen-  
tral. Suitable for the sale of automobile  
accessories. Rents, including steam heat,  
\$55 a month. Also, a loft of first floor over  
store, 48x68, with freight elevator; light on  
three sides, steam heat, all modern con-  
veniences; rental, including steam heat, \$45  
per month. Suitable for automobile acces-  
sories purposes. A good chance in this town  
for the opening of such a business.

Inquire of  
HIRAM MIN'TZ,  
Phelps Bldg., Binghamton, N. Y.

**FOR SALE—FIRST CLASS GARAGE IN A**  
good lively town in So. California. Equip-  
ment one year old; a fair stock of supplies.  
Four-year lease on building, which is 65x120.  
Will sell outfit for \$3,500, the estimated cost.  
Box E 45, care Motor Age.

**FOR SALE—GARAGE AND COMPLETELY**  
equipped machine shop, building, ground  
and tools for \$3,400; no trades. For particu-  
lars write Jos. Slagel, Fairbury, Ill.

**FOR SALE—GARAGE BUSINESS; CARRY**  
accessories; have a good repair business.  
Can get most any car to sell. A good town  
and plenty of cars. Will invoice stock or  
sell in bulk. Good location in Wisconsin.  
Box E 40, care Motor Age.

**FOR SALE—GARAGE IN A PROSPEROUS**  
Western city; all modern; largest storing  
capacity. Ford Agency.  
Box E 30, c/o Motor Age.

**FOR SALE — LARGEST AND BEST**  
equipped garage in Southern town of  
40,000 doing large winter tourist business;  
well equipped repair shop and vulcanizing  
plant. Storage capacity of 80 cars. Poor  
health reason for selling. Address Box E 56,  
care of Motor Age.

**FOR SALE—MAIN STREET GARAGE IN**  
Anaconda, Montana. Twelve thousand  
people. Three garages doing splendid busi-  
ness. This includes brick building 50x140,  
cement floors, metal ceilings and will store  
thirty cars. Well equipped machine shop  
and complete line of auto parts and acces-  
sories, including four rent cars. Sale carries  
agency for the Studebaker and Jackson cars.  
Can be bought for \$3,000 less than apprais-  
ers' value. Write M. A. Fulmor, Anaconda,  
Montana, for terms.

**INVENTIONS EXAMINED, PATENT AND**  
Working Drawings made. Models devel-  
oped and built. Free report as to patent-  
ability and cost for development of your in-  
vention. Address Inventions, Dept. A, The  
Toledo Engineering Agency, Toledo, O.



**FOR SALE—UP TO DATE MODERN**  
garage and auto supplies.

Address  
Box E 11 c/o Motor Age.

**OPPORTUNITY FOR PARTY WITH \$5,000**  
to \$10,000 capital to secure Buick agency  
in one of Idaho's best cities; population 6,000.  
Randall-Dodd Auto Co., Ltd.  
Salt Lake City, Utah.

**WANTED—BY 2 FIRST-CLASS MECHAN-**  
ics having a full set of machine tools and  
welding outfit, a suitable location for gar-  
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ferred. Address Walter De Vries, 138 W.  
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**WANTED TO RENT—ON OR BEFORE**  
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equipment, in live town or city. Address  
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**PRIVATE GARAGES. GALVANIZED-**  
steel or wooden. The finest line offered.  
If interested write. **GARAGE FACTORY,**  
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What size?

Write for my price bulletins.

We pay express charges.

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**AUTO TIRES RECOVERED AS FOLLOWS:**  
30x3.....\$5.80 32x3½.....\$7.80  
30x3½.....7.20 34x4.....9.65

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Non-skid treads applied from \$1.00 to \$3.00  
extra. Workmanship and material guaran-  
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**BARGAINS IN 600 NEW TIRES AND 400**  
used repaired tires. Any size.

	New.	Used.		New.	Used.
30x3	\$7.40	\$5.00	34x4	\$15.50	\$10.00
30x3½	10.50	7.00	36x4	16.50	10.00
34x3½	10.50	8.00	35x4½	19.50	11.00
32x3½	10.90	7.00	36x4½	19.85	11.00
36x3½	11.50	8.00	37x4½	20.50	12.00

All other sizes in proportion.

**SERLIN TIRE CO.,**

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**HIGHEST GRADE GUARANTEED TIRES—**  
**MICHELIN, GOODRICH, GOODYEAR,**  
**DIAMOND.** No seconds. We can quote you a  
very attractive price on any of the high-  
grade makes. Write for prices, stating size  
wanted. We sell for cash, and can under-  
sell others.

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**I WILL SELL YOU CLINCHER OR**  
straight side tires, either firsts or seconds,  
cheaper than any one in the United States.

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On Tires, Tubes and Relineers.  
New and used. Write for prices.  
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Phone Calumet 3127.

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22 years in the Rubber business. It is the  
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Manufacturers for U. S. and Canada for the  
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Write for our special tire bulletin on blem-  
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in America on this class of goods.  
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Hecht Magneto Exchange,  
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makes of magnetos and coils repaired and  
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new piston and rings fitted. Garage Air  
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General Machine Work

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Proper action compound put in springs. 1331  
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The better quality. Perfectly balanced mo-  
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Welding repairs of all descriptions. "Send it  
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4 cylinders .....\$3.00

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**STERLING ENGINE CO.,**

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## CYLINDER REAMED OR REGROUND—

New pistons and rings fitted. Gears cut,  
all kinds, nickel steel. We duplicate or  
weld the broken parts of any car. We weld  
broken aluminum and cast iron housings or  
cylinders and crank shafts. Ten years one  
stand. Over 20 years' mechanical experi-  
ence. The Kent Auto Co., Denver, Colo.

## CYLINDERS REGROUND AND FITTED

with new pistons and rings for \$7 to \$11  
per cylinder. We do this class of work ex-  
clusively and are thus able to give you the  
highest class of work at these prices. The  
Crown Machine Shop, Crown Point, Ind.

## CYLINDERS REGROUND.

We have special equipment for regrinding  
cylinders, fitting new pistons and rings.  
Prices, \$7.00 to \$15.00 per cylinder.

## Autogenous Welding.

Magneto and Battery work.

Prompt Service.

**BERNHARD & TURNER AUTO CO.,**  
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## CYLINDERS REGROUND

And fitted with new pistons and rings.  
**EXPERT REPAIRING AND REBUILDING.**  
Old parts satisfactorily repaired or dupli-  
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perfectly welded and machined. Aluminum,  
bronze and brass castings of any design.

**Hansen-Busch Auto Co.,**  
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## CYLINDERS REGROUND

and fitted with new pistons and rings for \$15  
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of all kinds. Send us your old parts and we  
will repair or duplicate them in record time.  
Cracked cylinders, gear cases, etc., welded  
and made good as new. Aluminum, bronze  
and brass castings of every description.

**THE ADAPT MACHINERY CO.,**

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## FORD

## CYLINDER GRINDING.

## NEW PISTONS, RINGS, PINS.

Our special equipment for grinding Ford  
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notice. A complete job better than new at  
prices that will interest Ford dealers as well  
as owners.

Write at once to

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## FORD DEALERS AND OWNERS

Your cylinders, all four holes, reamed  
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## NEW SPRINGS AND REPAIRS FOR ALL CARS.

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And reground and fitted with my racing pis-  
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Guaranteed to give 35 per cent higher speed,  
power and economy. Also make gears of all  
kinds and push rods and piston pins of  
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Welding of All Kinds of Metals  
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Autogenous welding of all metals, such as  
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Expert Welders on Automobile Parts.  
Reliable Welding Outfits for Repair Shops  
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\$45

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All metals brazed and welded are guaranteed. Experts on aluminum welding. Send for circular on aluminum welding. 1615 Wabash Ave. Tel. Calumet 5286.

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Co. Cracked and broken automobile and machine parts made serviceable at a fractional cost of new. Prompt service and highest quality of workmanship guaranteed. 714 South Wabash Ave., Chicago, Ill.

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Cast Iron, Steel and Aluminum, etc. Cylinders, Crankcases and Crankshafts a specialty. Engines, transmissions, etc., overhauled. Cylinders rebored with new piston and rings \$7 up. Comet Motor Works, 564 Jackson Blvd., Chicago.

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als welded, Piston pin scored cylinders mended by this process. Pistons, piston pins, and Cyl. rings made for all old-style cars. General repairs made in high class manner, prices right and all work guaranteed. Henry M. Williams, Vincennes, Ind.

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Guarantee

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Expert repair work on Radiators, Hoods, Fenders, Dashes, Tanks and Drip Pans. We guarantee all our work.  
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**ALL KINDS OF AUTO RADIATORS,**  
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Phone Calumet 3541.

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**THE M. & L. AUTO SHEET METAL**  
Works rebuild and repair radiators, hoods, fenders, tanks, lamps, etc.  
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Auto Dealers—19,792—\$30 or \$3 per M by states.

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All dealers, garages, supplies, manufacturers and repairs are typewritten and show financial rating.

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First lists available under new law. Automobile registrations furnished weekly during entire year 1914 for \$75. Also have dealers and motorcycles.  
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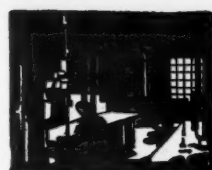
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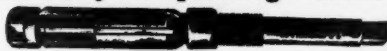
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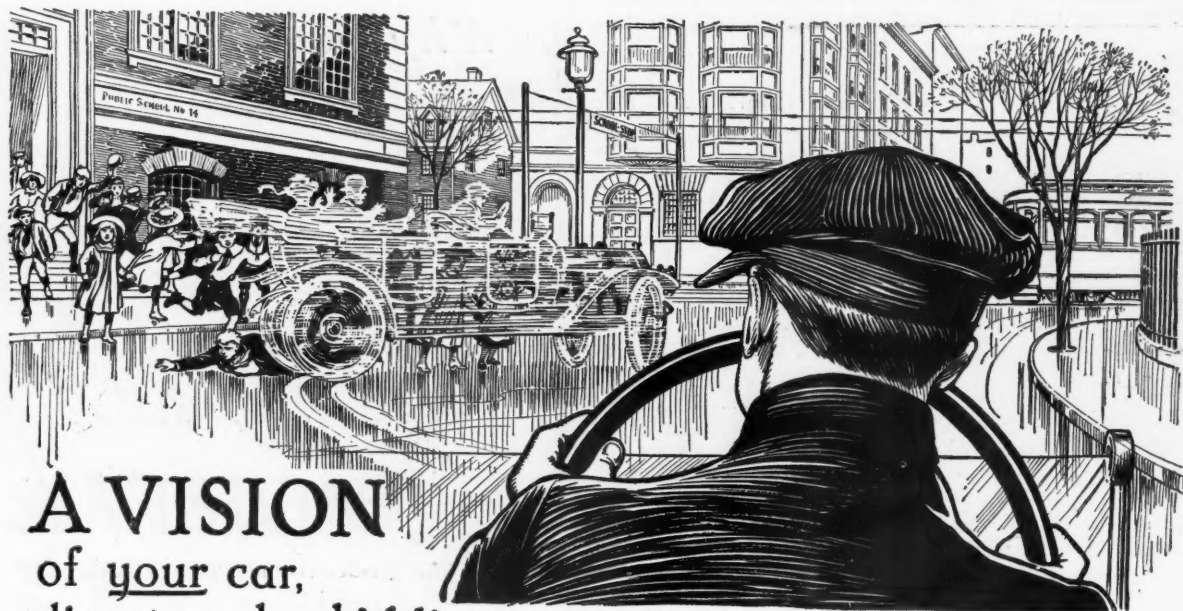
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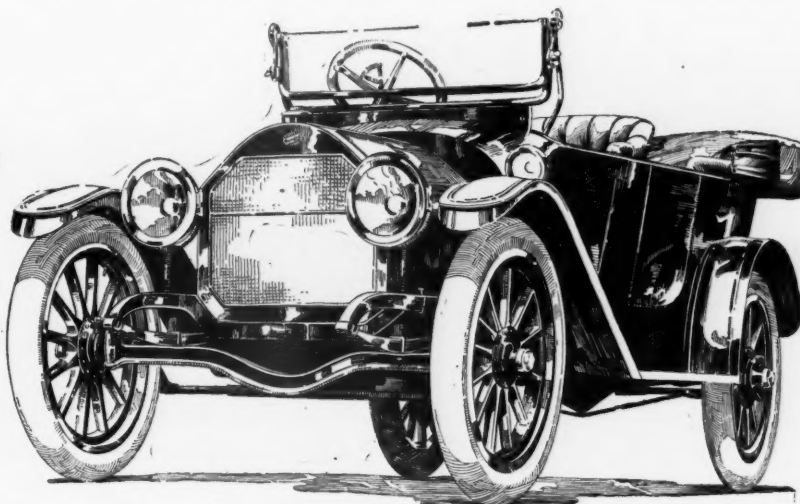
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